SELECTION OF STUDENTS FOR TRAINING AS TEACHERS

by

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Submitted in fulfilment of the
Requirements for the Degree of
Doctor of Philosophy
in the
University of Birmingham
1950.

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ABSTRACT

The present thesis is a report and analysis of work undertaken in an attempt to find the forces at work at the selection stage of teacher training.

Applicants for admission to the University of Birmingham Education Department and the Weymouth Training College have been subjected to certain procedures. These procedures, which have been applied to the whole applicant field and not solely to the successful candidates, have included

1. two types of structured interview in which the interview panels were required to rate the applicants on different traits;

2. a special form of reporting by Headmasters and Headmistresses who, similarly, were asked to rate certain traits;

3. various intelligence and other tests.

Additionally the interviewers have been submitted to certain tests which have included

1. individual comparison of interviewers interviewing the same candidates when the interviewers have been using structured interviews;

2. comparisons of panels working both a structured and a free procedure.

The analyses show that among the main forces operating at the selection stage were

1. an agglomeration of non-cognitive traits such as sincerity, cheerfulness, sensitivity, enthusiasm, etc., which seem principally to have determined the candidate's suitability for teaching;

2. superficial personal qualities such as voice, appearance, first impression etc.;

3. the part played in the school social and athletic life.

To a smaller degree, maturity and scholarship played a part in selection as also did tests when these were given.

From the performances of the interviewers it seemed that they behave more consistently and uniformly when working in a structured interview than when working freely, although the unreliability of the interview remained fairly high.

From the results of the experiments conclusions

have been drawn, especially concerning the need to expand the selection process so that the applicants are observed in as many different situations as possible.

CONTENTS

ACKNOWLEDGMENTS

The present work was undertaken during the tenure of a Research Fellowship in the Education Department and Institute of Education of the University of Birmingham.

No experimental research of this nature could have been even thus far completed without the generous co-operation of a large number of people. The writer particularly wishes to thank Professor F.J. Schonell, formerly of the University of Birmingham, under whose guidance the research was initiated. Even when Professor Schonell had taken up his appointment at the University of Queensland he continued to give guidance and encouragement by mail. The more immediate supervision, after Professor Schonell's departure, was taken over by Dr. W.D. Wall to whom the writer is deeply indebted.

To the Staff of the Education Department and to Miss M.B. Weinstock and her staff at the Weymouth Training College particular gratitude is due. They most patiently and generously allowed their usual selection procedures to be modified for the

sake of the research, and many of them gave advice and guidance without which the work would have suffered seriously.

Finally, the greatest indebtedness is to the writer's wife, not only for practical help in many directions, but also for that unfailing gentle encouragement without which the work would, at times, have seemed an intolerable burden.

CHAPTER I

THE PROBLEM CONSIDERED IN THE PRESENT RESEARCH

I

PURPOSE OF THE INVESTIGATION

The purpose of the present investigation is to elicit the forces at work when a student, having chosen to become a teacher, is subjected to a selection process by a University or Training College.

II

DEFINITIONS

By 'forces' is meant abilities, traits, actions, performances and so on which singly or in clusters operate in or underly the selection process.

The forces fall into three main groups:

1. Forces existing in the candidate himself in the form of abilities, skills personality traits and so on.

2. Forces within and among the persons, outside the candidate, doing the selection or

making the assessments of him.

3. Forces created between the candidate and the selectors by virtue of relationships established in special situations, notably the interview.

The forces existing within the candidate can be measured with varying degrees of accuracy by means of written and oral tests and from estimates and assessments provided by himself and other people.

The forces operating within and among the selectors can be studied if precise records of what selectors feel and think are made at the time of selection.

The forces operating between the candidates and selectors can be estimated indirectly by observing the same candidate with different selectors and, to a lesser extent, the same selector with different candidates.

III

NEED FOR THE INVESTIGATION

The need for such a study is two-fold;

1. to ensure, through a better knowledge

and understanding of the operating forces, that Universities and Training Colleges do select the best and most suitable candidates.

2. to ensure, similarly, that every candidate is subjected to a process which is comprehensive and fair.

At the present time, when selection procedures in many fields are undergoing change and extension, it seems particularly important to enquire into the underlying structure of these procedures, both from the viewpoint of the user of them and from that of the candidate submitted to them. By this means evidence for further refinement of the selection techniques may be obtained which may show where existing techniques are weak and need shoring up and where they are over-strong and may be pared down with a saving of time, energy and money.

IV

LIMITATION OF FIELD

The present work is concerned only with the selection stage. It is not concerned, except

indirectly, with any very extensive job or trait analysis; that is, it is not interested in whether the forces should be operating but only in the fact that they are. Secondly, it is not here concerned with any follow-up, that is, it is not interested in whether the candidates selected subsequently prove themselves suitable or otherwise.

V

GENERAL METHOD OF APPROACH

In the present study unselected batches of candidates for the teaching profession have been used for all the main experiments. By 'unselected' is meant that, wherever possible, the whole batch of applicants for admission to a University or Training College has been subjected to certain processes and not merely those who were successful at the selection stage. Where the whole batch of candidates could not be used a random sample from the unselected population has been extracted.

The candidates have been exposed to various forms of reporting, interviewing and testing, and

the analysis of the results of these forms the body of work described in this thesis.

VI

RATIONALE OF METHOD OF APPROACH

The usual method of measuring the efficiency of a selection procedure is to follow up the careers of the selected candidates and to work backwards from criterion measures obtained some years after the selection. Such a process suffers from a number of disadvantages. Among these are

1. Only those candidates successful at the selection stage are available for subsequent follow-up.

2. A reluctance on the part of the selectors to prove themselves wrong or to let their students down means that poor students, once admitted, are often made to do better than their abilities warrant or than they would have done in competition with a proportion of the unselected candidates.

3. Success or failure in subsequent examinations and careers is partly determined by chance effects over which the candidate has little control.

Among such chance effects may be mentioned socio-economic standing, departmental and faculty policy variations, (1.1) the type of school or head teacher a student gets on leaving his training institution, the type of subject the student chooses to teach and so on.

4. The heterogenity of standards against which the candidate is assessed when he has left his University or Training College introduces considerable unreliability in the criterion of success. It is for this reason that much research of a follow-up nature has chosen as its criteria marks and estimates obtained while the student was still at College. The narrowness and limitations of such criteria are obvious.

Validation of a selection procedure by follow-up remains an important process but it is not the only means of measuring its effectiveness. Additionally, it is felt, one needs to lay bare the configurations of traits, etc. which make for success or failure at the selection stage itself and to compare the patterns so discovered with those which operate in the job situation. Parallel investigations of this kind, equating the configu-

rations found in the two situations have two advantages over the follow-up technique:

1. The effect of selection is overcome.

2. The selection pattern can be equated with the job pattern as it exists now. In the follow-up method a selection procedure now is compared with a follow-up survey some years hence. In a profession such as teaching where methods and philosophies change, the pattern of a successful teacher changes and a selection procedure in operation at one time may be largely unsuitable by the time the follow-up is undertaken.

VII

CONCLUSION

The present research seeks, therefore, by exposing the dynamics of some part of the selection procedure, to provide facts of which selectors should be aware and which may prove useful in the creation of other selection techniques.

CHAPTER II

REVIEW OF PREVIOUS RESEARCH

I

INTRODUCTION

Following the second world war, when selection procedures in different branches of the armed forces were developed to a high degree (2.1), there has been an increasing interest in the part that such procedures might play in other fields, particularly in Industry (2.2, 2.3, 2.4), the Civil Service (2.5) and the Universities (2.6, 2.7, 2.8).

The forces underlying these or any other procedures depend upon three things; the people being selected, what they are being selected for and the means being used to select them. This chapter will be mainly concerned with the second and third of these and will consider first the competencies and traits necessary for teaching, and secondly the methods of selection for it.

II

TEACHER TRAITS AND CRITERIA OF TEACHING EFFICIENCY

There have been innumerable studies of the traits necessary in a successful teacher. Cattell (2.9) in this country and Barr (2.10, 2.11), Eliassen and Martin (2.12), Rostker (2.13), Bishop (2.14), Lins (2.15), Von Haden (2.16) and many others in America have listed desirable teacher traits as they have been obtained from authorities such as Education Officers, Headmasters, College Supervisors and so on. It is clear from a study of these that no clear picture of the successful teacher exists in the minds of even these authorities. Further, as Eliassen and Martin's study showed the qualities which are considered desirable vary from time to time, due, presumably, to the changing concepts of the teacher's function consequent upon changing philosophies and practices in education.

A parallel approach has been to use tests to measure qualities in teachers which are considered to be related to teaching efficiency. Tongerson (2.17), Barr (2.10), Brookover (2.18) are among

those who have applied this method. Such studies have usually reported low correlations between the tests and teaching ability though this may be as much due to lack of a satisfactory criterion of teaching ability as to inherent weaknesses in the tests.

In an attempt to differentiate between good and bad teachers Tongerson (2.17) and Lins (2.15) have also used pupil achievement, as measured by various tests, as a criterion. They report correlations between .38 and .68 for validity and .85 for reliability. Although it is difficult to find tests which will cover the whole range of a child's development, it seems that this policy of going to the end products in education is one which will repay further study. The question, why one set of teachers is better than another will still, however, arise, which still involves breaking down their personalities into measurable elements. Burt (2.19), Cattell (2.20) and Eysenck (2.21) have attempted to analyse personality in this way. It remains to be shown which components of personality exist and in what degree among various types of teachers. Cattell (2.22) has suggested that independent rather than overlapping personality

traits should be investigated and urges that six of his twelve factors, namely, Cyclothymia - Schizothymia, Surgency - Desurgency, General Intelligence, General Emotionality, Dominance - Submission and Character Integration should be tested.

There have been few studies of teacher traits using the factor analysis technique. Smalzried and Remmers (2.23), using a rating scale which included ten traits, located two factors, empathy and professional maturity. Hellfritzsch (2.10) found four factors: (1) general knowledge and mental ability (2) teaching ability (3) personal and social adjustment (4) sense of vocation. Vernon (2.24) applied the technique to students already in a teachers' training college in a survey of the main types of educational ability already there. It may be that the appraisal of teaching ability will need to be different according to the three main types he found viz. Scientific - Mathematical, Arts - Humanistic and Practical. There is little doubt that in the ordinary, non-scientific, day to day work of training supervisors this is, in fact, done.

Although an analytic approach shows no great

uniformity in its results, it may still be possible to judge teaching ability as a whole. This is the regular practice in training institutions where teaching marks are awarded each year. Martin (2.25) reports that these ratings are unreliable and invalid. The work of Tudhope (2.26) and Lawton (2.27) seems to show that, in this country, this is not so, Tudhope obtaining correlations of .81 between college teaching mark and ability after some years' experience. As Lawton points out, however, it is fallacious to argue that this type of finding shows that the selection procedure was satisfactory since such an argument ignores the facts that the group used was a selected one and that the final teaching mark was, in any case, awarded by those who had originally done the selecting.

III

METHODS OF SELECTION

Very few Universities seem to have any scientific method of selection or to have published any comprehensive analysis of the methods they do employ. Exception must be made, under the latter heading, of Sanders' (2.28) thorough survey of the methods adopted in the various Universities in

Australia. This is less concerned with suggesting appropriate selection procedures than with showing the consequences of existing ones.

In America more use of scientific selection methods seems to have been made than in this country. Typical of the most comprehensive of these is the procedure used at Syracuse University (2.29) where data on health, speech, scholarship, personality, English proficiency, interests in current affairs, scholastic ability, etc., are obtained. As a result of this it is reported that

'Students admitted to the School of Education are superior as a group to the general student body at Syracuse University, and markedly superior to the national norms on nationally known tests -----. Since the claims for Education Students are founded on many bases, it is reasonable to expect that they will be successful, as a group, in teaching'

- a final observation which may or may not follow.

In this country the approach has been clinical rather than psychometric; in America too (2.10, 2.12) there has been some reaction against a purely objective procedure resulting in fairly general agreement with the view expressed by Vernon (2.30)

in connection with Civil Service selection procedures that subjective assessments are a necessary adjunct to objective data.

Interviews. The traditional manner of securing evidence subjectively has been through the interview. This has been the subject of wide study; a summary of the earlier work of Webb (2.31), Bingham and Moore (2.32), Magson (2.33), Symonds (2.34) and Strang (2.35) will be found in Vernon and Parry's book (2.1). Particular mention must be made of some earlier work of Harvey (2.36), he being among the first to stress the important concept that it was the attitude of the interviewer that was being moulded in the interview.

At the University level, Hartog and Rhodes (2.37) showed the fallibility of experts, albeit with a highly selected sample of interviewees, without its seeming to have had any great impact on these institutions.

The best discussion on how interviewers come to their conclusions, advice on the working of the interview, is to be found in Oldfield's book (2.38) although he stresses the part played by the attitude

of the candidate and places rather less emphasis upon that of the interviewer. Oldfield observes (p. 72) that if the sole purpose of the interview is the assessment of personal qualities, it is questionable whether standardisation of the topics to be discussed has not more disadvantages than advantages. Buzzard (2.39) and Vernon (2.40), however, give some importance to report forms by which it can be ensured that certain ground is covered without rigidity. Magson (2.33) earlier, had gone as far as to urge the need for rigidly controlled conditions. Most interviewers prefer their own pattern of interviewing, Wilson (2.41) requiring the candidate to work hard, Misselbrook (2.42) advocating the insertion of short practical tests in the interview, both as a means of overcoming tension and of testing the candidate, and Freeman (2.43) going so far, in some cases, as to make the candidate as uncomfortable as possible. It is difficult to find comparative evidence of the efficacy of these different approaches. Investigations of both reliability and validity are not, on the whole, very favourable (see 2.1, 2.33 and Bobbitt and Newman, 2.44) though the work

of Newman, Bobbitt and Cameron (2.45), who interviewed over five hundred prospective coastguard officers, showed that reliability was possible in the hands of psychologically trained interviewers working to an agreed schema.

Factor Analysis does not seem to have been extensively used in this field, although Rafferty and Deemer (2.46) report a factor analysis of psychiatric impressions from 389 flying cadets which gave three meaningful factors; (1) age coefficient (2) poise at interview (3) achievement. The traits assessed for this analysis were extremely heterogeneous and little light was therefore thrown on the underlying structure of the interview itself.

The use of rating scales, or the allocation of a definite grade or mark in addition to more ephemeral observations, has become increasingly popular. Their use has been considered by Vernon (2.40, 2.47, 2.48) and Symonds (2.34). Thorndike (2.49) supports the view that personality traits, if they exist, can be said to exist in some amount, and Cattell (2.50) asserts that when rating scales are used carefully, as he describes, they are

highly valid. Most workers agree that their reliability is increased by pooling independent estimates (2.51, 2.34).

Tests. Although tests, apart from School examination results, have not been extensively used at the selection stage in this country, they have been used in America, and both in that country and in this there has been a considerable application of various tests to students already in Universities and Training Colleges. This work has been so well summarised by Eysenck (2.52) that no useful purpose would be served by repeating it here.

As Eysenck observes in his summary, intelligence tests, especially when combined with school standing, can be used to predict University success with considerable accuracy. This is not the same as predicting teaching efficiency, which, according to different investigators, correlates with intelligence test results anywhere from .15 to .72. Eysenck also suggests that special achievement tests can give useful evidence in the absence of comprehensive school records, and that

interest questionnaires can be a useful part of a selection battery. Since Eysenck's summary Heim (2.53) has shown that science students do somewhat better in intelligence tests than arts students.

The possibility that an admission procedure might include tests other than the interview was greatly enhanced by war-time experience in other fields. The work of selection in the forces has been described by Vernon and Parry (2.1), Mercer (2.54) and Garforth (2.55), and its later application to industry by Munroe Fraser (2.56) and others. Its use in selecting youth leaders has been reported by Beverstock (2.57) and it has been employed during the reconstruction period in the Civil Service (2.58), where its improved validity has already been evidenced by Vernon (2.30). Vernon states that it should be possible to extend these procedures to other fields though there is no guarantee that shortened versions of them would be as useful. So far they have not been used at the University level mainly owing to the administrative difficulties involved.

IV

CONCLUSION

It is now necessary to recall that the main purpose of the present study was to seek for the forces at work at the selection stage of teacher training.

There is little work in that reviewed above which has been directly concerned with this problem, although all of it has impinged upon the problem in some way. Thus, a study of the previous work in interviewing and testing has been necessary as these are among the chief instruments within and between which the forces would be found operating. A study of modern selection procedures in other fields has been necessary so that further probes might be inserted into existing practices.

In the main, interview and test researches reported above, with which the present work will have most in common, have suffered from three main weaknesses:

1. By far the greater bulk of the work has been done with candidates already selected and in

training. The fallacies involved in any argument based on such experiments have been stated by Burt (2.59). In the main, work done with highly selected groups can only give a very distorted picture of what would have happened with the total population.

2. A good deal of the work has been done with specially created, small-scale experiments rather than in company with the tension, conflict, urgency and pressure, which, in practice, are the associates of University selection.

3. Experimental work has not been designed for analysis by anything but the simplest statistical techniques. Thus, apart from recent follow-up in the Civil Service selection procedures and in one or two other cases, very little use has been made of factor analysis. Even more noticeably, little or no use has been made of factorial design, so that in few cases has it been possible to secure estimates of error in experiments where, for example, interviews and interviewers were being studied.

The need still exists, therefore, for a number of statistically designed experiments to be

conducted in real situations, and it is in this way that the present work fits into the pattern of that outlined above.

CHAPTER III

STATISTICAL TECHNIQUES

I

CHOICE OF STATISTICAL TECHNIQUES

The main statistical techniques used in the present investigation have been the Analysis of Variance and Factor Analysis. The former has been described each time it has been used since the break down of the variances involved has been different in each case. The latter technique has been used in the same way throughout and this chapter is devoted to a statement and explanation of the assumptions which have been made in the present instance.

II

REASONS FOR CHOICE OF CENTROID METHOD OF FACTOR ANALYSIS

With several different methods of Factor Analysis available, the choice of any one of them is determined partly by the nature of the

data being handled, partly by the results expected and partly by the preferences of the individual investigator for a particular form of solution. In any case, once the rank of a given matrix of correlations has been fixed by the determination of communalities, each type of solution can be converted to most other types; the types of solution are differentiated rather by viewpoint than by anything more fundamental. Geometrically this viewpoint is determined by the choice of axes against which to refer the points representing the variables.

In the present case solutions were sought which would give the main broad groupings of certain variables. These variables were mostly personality traits which were estimated and assessed rather than measured. There was no reason to suppose that meaningful groupings or clusters, if obtained, would be uncorrelated or that they would not overlap. A method of analysis leading easily to group factors, orthogonal or oblique was therefore sought, and the centroid method followed by rotations seemed the most suitable.

III

THE NEED FOR ROTATION OF AXES

It has become a common practice in this country to use the centroid method of analysis without the subsequent rotations, the argument being that all the information available after rotation is also available beforehand. Where a comparison between certain exclusive groups of variables rather than a study of the structure of groups is all that is required there may be some justification for this. Whenever the number of factors becomes large, however, the interpretation by comparison, which is based on the principle of successive dichotomy, becomes increasingly difficult. This is because the number of variables on which to base the interpretation is roughly halved with each successive factor (Fig. 3.1) and hence the interpretation becomes increasingly based on minutiae.

Further, this method of interpretation conflicts with the requirements of parsimony since n centroid factors give rise, in effect,

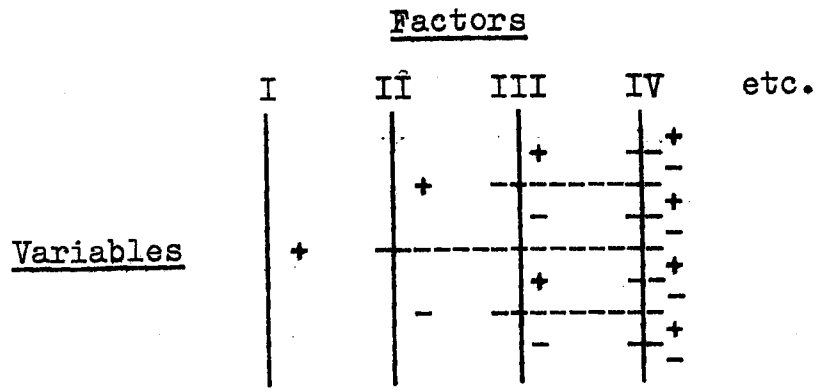


Fig. 3.1 - Successive dichotomy in Centroid Factors.

to $\frac{n(n+1)}{2}$ bipolar factors needing interpretation.

Again, the centroid process almost always produces a general factor for its first factor as a consequence of its particular procedures, but whether a general factor exists in fact is often doubtful. It is agreed that a general factor plus uncorrelated group or bipolar factors on the one hand, and correlated or oblique group factors on the other, are two ways of looking at the same thing, namely that it is impossible wholly to describe the given data in terms of independent concepts. When heterogeneous batteries of tests are used, as in the present investigation, it seems simpler and more reasonable to accept the existence of correlated group factors than to struggle to identify a general factor.

Finally, the method of obtaining the centroid factors extracts the maximum possible variance at each stage and thus produces factors which show rapidly decreasing contributions to the total variance. This again is a consequence of the method of working and there is no priori reason for supposing that it corresponds with the nature of things. What was expected in the present case was that a few main group factors of roughly equal importance would emerge. Other considerations such as hyperplanar fit and simple structure have often resulted in the contributions to the total variance being markedly different, but no assumption that they ought to be different was ever made.

IV

OUTLINE OF METHOD USED

a. Extraction of Factors

Consider a set of n variables giving rise to an n x n correlation matrix. Then, geometrically, the variables may be represented by a set of n vectors of certain lengths in a space of m dimensions, the vectors being orientated in such a way that the scalar products of pairs of vectors are equal to the correlations between them.

The first task of Factor Analysis is to find the lowest value for m which will allow a complete or reasonably complete description of the given variables, and having found it, to find the projections of the vectors on each of the m axes. The value for m gives the number of 'common factors' and the values of the projections give the 'factor loadings' for the variables.

Algebraicly, the variables can be expressed in terms of the common factors as

$$z_1 = a_{11}F_1 + a_{12}F_2 + a_{13}F_3 + \cdots + a_{1m}F_m + a_1U_1$$

$$z_2 = a_{21}F_1 + a_{22}F_2 + a_{23}F_3 + \cdots + a_{2m}F_m + a_2U_2$$

$$z_3 = a_{31}F_1 + a_{32}F_2 + a_{33}F_3 + \cdots + a_{3m}F_m + a_3U_3$$

$$\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots$$

$$z_j = a_{j1}F_1 + a_{j2}F_2 + a_{j3}F_3 + \cdots + a_{jm}F_m + a_jU_j$$

$$\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots$$

$$z_n = a_{n1}F_1 + a_{n2}F_2 + a_{n3}F_3 + \cdots + a_{nm}F_m + a_nU_n$$

where F_1, F_2 :..., F_m represent m common factors

a_{jk} = loading of factor k in variable j

U_j = Unique factor for variable j.

The unique factor for any variable represents the portion of the variable not explained in terms

of its correlations with other variables in the set.

Assuming that m factors are sufficient to describe completely the given correlation matrix, then the observed correlations can be written

$$r_{jk} = a_{j1}\, a_{k1} + a_{j2}\, a_{k2} + \ldots\ldots + a_{jm}\, a_{km}$$

$$(j = 1, 2, \ldots\ldots, n)$$

In the geometrical description it was stated that the vectors were of certain lengths. The length of each vector is in fact proportional to the square root of the 'communality', where the communality is that part of the total variance of the variable explicable in terms of the common factors. Algebraicly, the communality is given by

$$h_j^2 = a_{j1}^2 + a_{j2}^2 + a_{j3}^2 + \ldots\ldots\ldots + a_{jm}^2$$

The communality being found, then each vector will have m coordinates for its end point P_j, viz.

$$P_j = a_{j1}, a_{j2}, \ldots\ldots\ldots, a_{jm}$$

In a centroid analysis the first factor F_1 is found by passing an axis of the m - coordinate system through the centroid of P_1, P_2, ... P_j, ... P_n.

It can then be shown (3.1 p.149) that the coordinate of P_j on this axis i.e., a_{j1} can be written

$$a_{j1} = \frac{\sum_k r_{jk}}{\sqrt{\sum_j \sum_k r_{jk}}} = \frac{S_j}{\sqrt{T}}$$

$$(j = 1, 2, \ldots\ldots, n)$$

Where S_j = sum of correlations, including communality, in column j of correlation matrix

T = total of all correlations, including communalities in the matrix.

The first factor explains a part of the correlation between each pair of variables. The residual part of the correlation, the first factor residual, is

$$_1r_{jk} = r_{jk} - a_{j1}\, a_{k1}$$

and represents the variables as now seen in a space of m - 1 dimensions with its axes so orientated as to be orthogonal to the fixed first axis.

Since the first factor axis was passed through the centroid of the configuration of vectors, the projections of these vectors on the remaining m - 1 axes will be such that the

algebraic sum of the projections on each axis will be zero. Hence location of any of the remaining m - 1 axes in any direction, the first factor axis being fixed, will always give

$$\sum {}_1 r_{jk} = 0$$

Hence the location of the second axis and the calculation of the second factor loadings in the same way as before is prevented.

This difficulty is overcome by scaling some of the variables in the opposite direction, a procedure which leaves the variables otherwise unchanged. Consequently some of the vectors are rotated through 180^{o} so that now

$$\sum {}_1 r_{jk} \neq 0$$

and the second axis can now be located through the centroid of the modified vectors as seen in the m - 1 coordinate space, and the factor loadings (with changed signs) obtained as before.

$$a_{j2} = \frac{\sum_k {}_1 r_{jk}}{\sqrt{\sum_j \sum_k {}_1 r_{jk}}}$$

This procedure can be repeated until the whole correlation matrix has been explained i.e., until a zero residual matrix has been obtained. The

coefficients a_{jk}, with signs reversed where necessary, then give the various factor loadings.

In the present study an approximation to the communalities was used in accordance with Thurstone's suggestion (3.1 p.299), namely that of using the largest correlation in each row as the original estimate and replacing it in each residual matrix by the largest residual correlation irrespective of sign.[1]

The sign changes were made in accordance with the rule (3.2) that the column in the residual matrix with the largest absolute sum should have all its signs temporarily made positive and the remaining residual correlations adjusted accordingly.

Since a correlation matrix based on fallible data will analyse down to a final residual matrix which only approximates to zero, the analyses were, in the present study, carried to the point where

---

1. In one case (Chap. IV, Section A) an iteration of the factor analysis with calculated communalities based on the previous analysis gave so little difference that, bearing in mind the need for groupings of variables rather than precise measurements, it was decided that the iterative process was not warranted.

1. all the residual correlations were less than twice the standard error of their parent correlations

and/or

2. all factor loadings in the last factor extracted were less than ·3

and/or

3. less than 5% of the total variance was explained by the last factor extracted.

b. Rotation of Axes

As has been observed earlier, it is often possible to obtain a more meaningful interpretation of the factors if the axes are rotated about their origin to take up different positions.

This may be done in two ways:

1. By moving the m-coordinate system as a whole thus keeping the axes orthogonal.

2. By moving the axes independently thus making them oblique.

In the present study both types of rotation have been used, the main considerations, apart from the avoidance of complex mathematical procedures, being

1. to convert the general factors with positive and negative loadings into group factors with positive loadings only;

2. to level up the contributions of each factor to the total variance;

3. to describe the variables with the lowest possible complexity i.e., in the factor matrix to produce as many zeros in the rows as possible;

4. to cause as many of the test vectors as possible to lie in the various hyperplanes of m - 1 dimensions i.e., in the factor matrix to produce as many zeros as possible in the columns.

When orthogonal rotations were being effected the two by two rotational method was used, each new factor loading being obtained from the old by the conversion

$$b_{j1} = a_{j1} \cos\theta - a_{j2} \sin\theta$$
$$b_{j2} = a_{j1} \sin\theta + a_{j2} \cos\theta$$

following a rotation of a pair of axes through an angle θ .

When oblique rotations were being undertaken the method of extended vectors was used (3.1 chap. XI), with or without preliminary Landahl rotation (3.3) as necessary, and the various plots of the projections of the vectors on the

temporary axes so obtained were used to determine the rotating matrix Λ.

Then, if F is the original centroid matrix of loadings, the new loadings V

where $V = F\Lambda$

give the structure on the reference vectors i.e., on the lines through the origin of the m coordinate space perpendicular to each (m - 1) coordinate hyperplane. The analysis was only carried to this point and the structure on the primary vectors i.e., the intersections of the hyperplanes was not calculated.

In each case where oblique rotation was effected the angles between the reference vectors were calculated by pre-multiplying the rotating matrix by its transpose

$C = \Lambda'.\Lambda$

CHAPTER IV

DESCRIPTION, ANALYSIS AND PRELIMINARY DISCUSSION OF EXPERIMENTAL WORK. STAGE 1.

SECTION A. FIRST ANALYSIS OF INTERVIEW PERFORMANCES

I

PURPOSE OF EXPERIMENT

The purpose of the experiment was two-fold;

1. to determine how interviewers grouped certain candidate traits which they had been asked to consider when interviewing.

2. to determine the weightings of these traits in relation to the final assessment of teaching suitability.

II

EXPERIMENTAL DESIGN

The Sample. The sample consisted of 420 candidates (258 men and 162 women) who had applied to the University of Birmingham Education Department for admission in 1948 as four-year students. This constituted the whole field of applicants who had

shown Birmingham as first or second choice on their application forms, together with a few who had put Birmingham as third or fourth choice to Oxford, Cambridge or London, and omitting a few for whom interview data was incomplete.

The Interviewers. The interviewers were drawn from the whole staff of the Education Department and from representatives of the academic departments in which the applicants intended to graduate. A panel consisted of two members of the Education Department and one from the academic department concerned and remained constant only over a day's interviewing i.e. usually six interviews.

The Interview Schedule. The interview schedule (Appendix 1) listed twelve traits which the interviewers were asked to assess in each candidate. The traits were

1. Interests
2. Part played in School Activities and Social Life of the School
3. Physical Activities
4. Physical Bearing
5. Speech (1) Dialect, Local Accent or Intonation
   (2) Voice Quality
   (3) Power of Expression

6. (1) General Appearance and Social Attractiveness
   (2) Personal Adjustment
   (3) Adjustment to Interviewers

7. Sense of Vocation

8. Suitability for Teaching

Each trait was provided with a five point A to E scale for recording results, the extremes of the scale being defined for each trait. Thus, for example, Physical Bearing appeared as

Physical Bearing

A	B	C	D	E
Commanding, Vigorous, likely to stand out in any group.				Insignificant or having physical characteristics likely to prove a handicap.

Interviewers were permitted to add + or - signs or to ring two grades as was felt necessary. Space was also provided for observations and comments and the distribution of ratings which would approximate to a normal distribution was stated.

Interview Procedure. Each candidate was interviewed for at least 20 minutes. The method and form of the interview was left to the discretion of the interviewers who were asked only that they should, by the end of the interview, have accumulated sufficient data to enable them to rate the twelve traits. The academic representative,

being principally concerned with matters not on the schedule, took a part of the time - and in the opinion of some Education Department representatives a disproportionate part - in pursuance of his own interests, but his opinions on the twelve traits were sought and incorporated in the joint ratings. Each panel finally submitted one agreed interview schedule for each candidate.

III

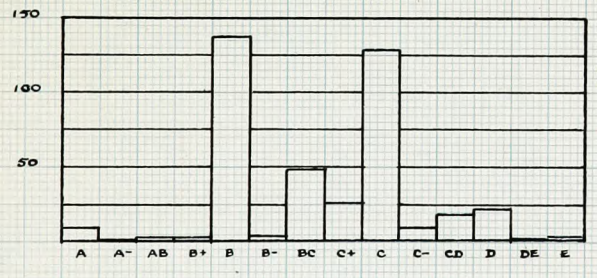
ANALYSIS AND STATEMENT OF RESULTS

The distribution of grades is shown in Fig.4.1. It was immediately apparent that grades intermediate to the main grades had been used in a most unsystematic manner. To get a better graphical picture of the general distribution of grades all intermediate grades were divided between the main grades either side of them in proportion to the numbers already in these main grades. These simplified distributions are shown in Fig. 4.2. For scoring purposes the original grades were converted to T-scores with a mean of 50 and a standard deviation of 10 (4.1 pp. 272-306)

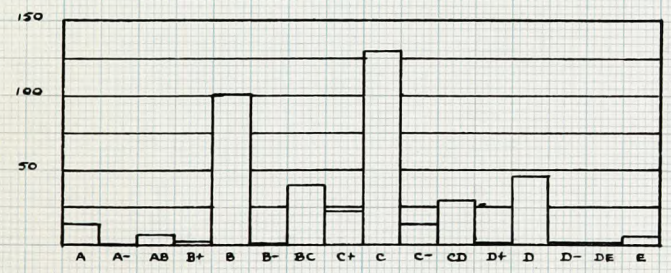
INTERESTS

SCHOOL ACTIVITIES

PHYSICAL ACTIVITIES

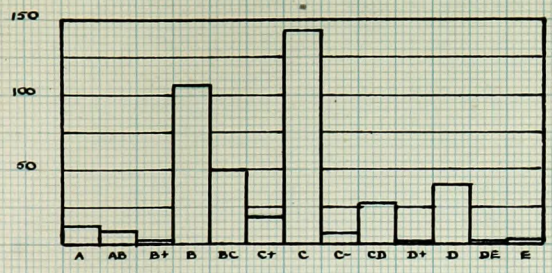


PHYSICAL BEARING



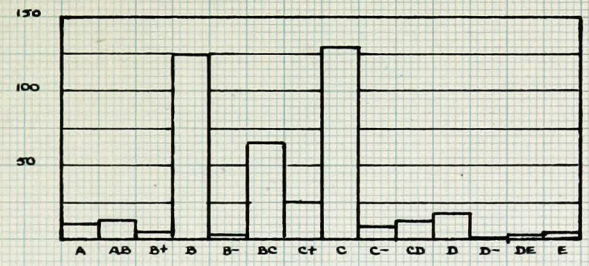
DIALECT

FIGURE 4·1

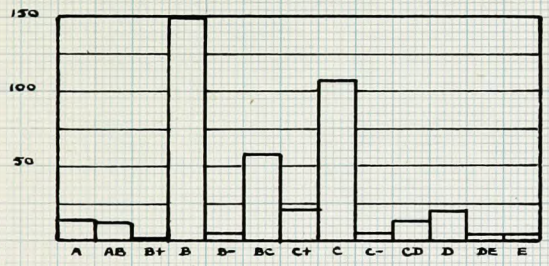


VOICE QUALITY

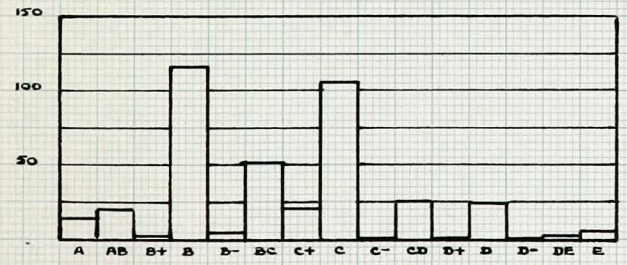
POWER OF EXPRESSION



GENERAL APPEARANCE

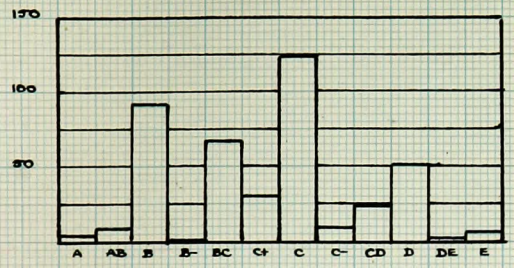


PERSONAL ADJUSTMENT

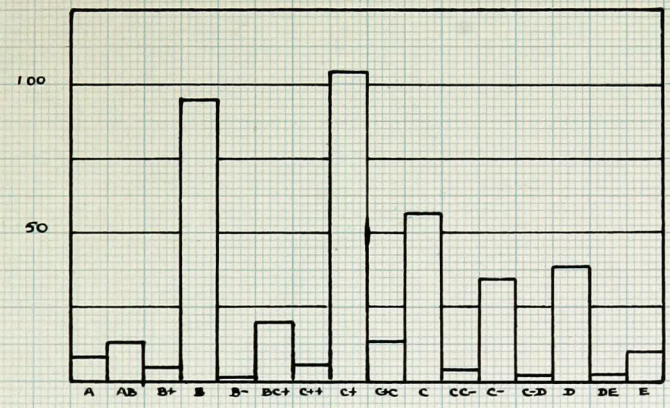


ADJUSTMENT TO
INTERVIEWERS

FIGURE 4.1

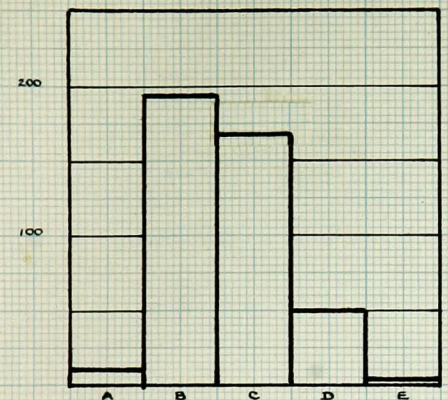


SENSE OF VOCATION



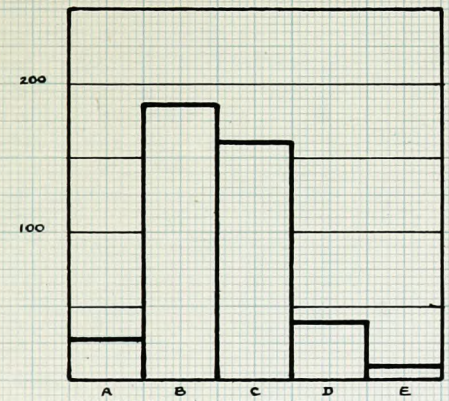
SUITABILITY FOR TEACHING

FIGURE 4·1



INTERESTS

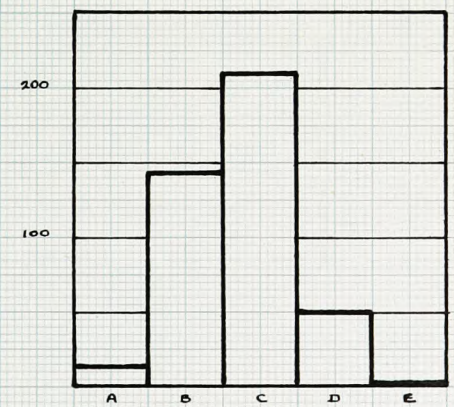
SCHOOL ACTIVITIES



PHYSICAL ACTIVITIES

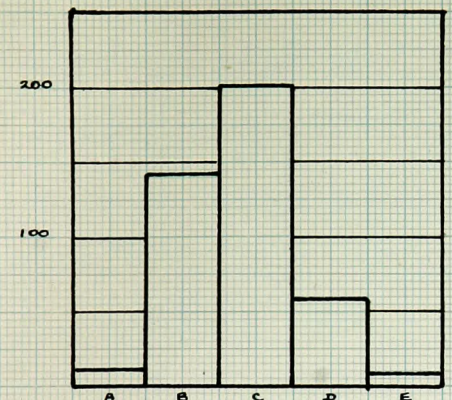
PHYSICAL BEARING

DIALECT

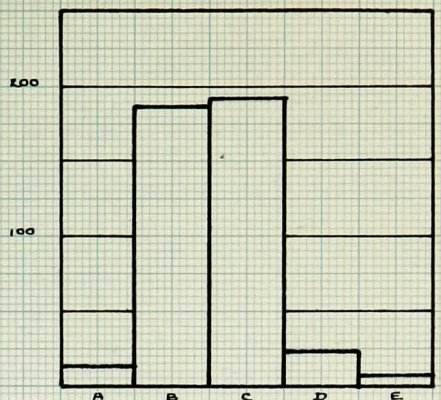


VOICE QUALITY

FIGURE 4·2



POWER OF EXPRESSION

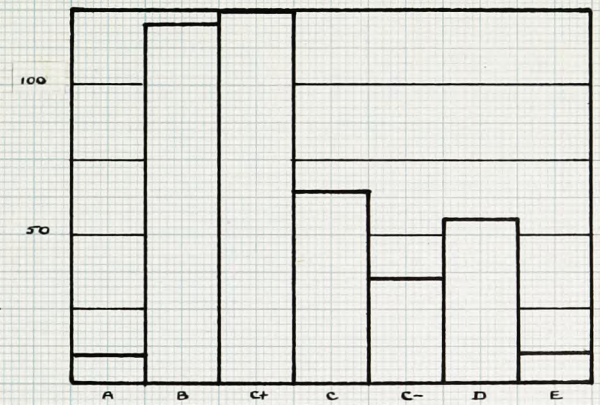


GENERAL APPEARANCE

PERSONAL ADJUSTMENT

ADJUSTMENT TO INTERVIEWERS

SENSE OF VOCATION



SUITABILITY FOR TEACHING

FIGURE 42

The intercorrelations between the twelve traits were calculated according to the Bravais-Pearson Product-Moment formula. The complete matrix is given in Appendix 1. A centroid analysis of the matrix was taken to three factors as given in Table 4.1.

An oblique rotation was effected by the method of extended vectors and post-multiplication of the matrix of centroid loadings by the rotating matrix Λ where

$$\Lambda = \begin{vmatrix} 325 & 390 & 242 \\ -343 & -228 & 888 \\ -882 & 892 & -390 \end{vmatrix}$$

gave a close approximation to simple structure on the reference vectors. The projections on the reference vectors were found to be as shown in Table 4.2.

The cosines of the angles between the reference vectors were given by the matrix product $\Lambda'.\Lambda$ i.e.

$$C = \begin{vmatrix} 1 & -582 & 118 \\ -582 & 1 & -456 \\ 118 & -456 & 1 \end{vmatrix}$$

Table 4.1. - Unrotated Centroid Loadings. (F)

	Trait	I	II	III	h^2
1.	Interests	700	096	239	556
2.	School Activities	651	381	136	587
3.	Physical Activities	473	576	-060	559
4.	Physical Bearing	755	152	-268	665
5(1)	Dialect	656	-303	-352	646
5(2)	Voice Quality	756	-353	-237	752
5(3)	Power of Expression	808	-235	152	731
6(1)	General Appearance	785	-061	-384	767
6(2)	Personal Adjustment	773	-085	140	624
6(3)	Adjustment to Interviewers	794	-174	298	750
7.	Sense of Vocation	708	-027	243	561
8.	Suitability for Teaching	903	-034	187	852
Contribution to Total Variance		54.36%	6.87%	5.87%	
Total Variance extracted		67.10%			

Table 4.2. - Structure on Reference Vectors. ($V = F.\Lambda$)

	Trait	I	II	III
1.	Interests	-016	464	161
2.	School Activities	-039	288	443
3.	Physical Activities	009	000	649
4.	Physical Bearing	430	021	422
5(1)	Dialect	845	011	027
5(2)	Voice Quality	576	164	-038
5(3)	Power of Expression	209	504	-072
6(1)	General Appearance	615	-022	286
6(2)	Personal Adjustment	157	446	057
6(3)	Adjustment to Interviewers	055	615	-079
7.	Sense of Vocation	025	499	053
8.	Suitability for Teaching	140	527	115
Direct contribution to Total Variance		14.18%	14.03%	7.80%

corresponding to angles

$$\begin{vmatrix} . & 136 & 83 \\ 136 & . & 117 \\ 83 & 117 & . \end{vmatrix}$$

A separate computation of the correlation matrix for men and women gave correlations which were in very close agreement and none which differed significantly.

To determine the weightings of the first eleven traits of the schedule which would give the best estimate of the important final rating 'Suitability for Teaching' a multiple regression equation of the form

$$S_c = a_1S_1 + a_2S_2 + \ldots\ldots + a_nS_n$$

where $S_1, S_2, \ldots, S_n$ = standard scores on traits

S_c = standard score on criterion

$a_1, a_2, \ldots, a_n$ = weighting coefficients

was calculated by Aitken's modified method of pivotal condensation (4.2 pp. 348-351). The modified method was used so that an estimate of the weighting coefficient, $\frac{\text{S.E.}}{\Delta}$, could be obtained. These coefficients and their corresponding standard errors are given in Table 4.3.

Table 4.3. - Regression Equation Coefficients

	Trait	Coeff.	S.E.
1.	Interests	109	025
2.	School Activities	177	023
3.	Physical Activities	-017	017
4.	Physical Bearing	137	029
5(1)	Dialect	060	025
5(2)	Voice Quality	028	030
5(3)	Power of Expression	138	033
6(1)	General Appearance	059	030
6(2)	Personal Adjustment	150	029
6(3)	Adjustment to Interviewers	112	031
7.	Sense of Vocation	225	026

Using these weighting coefficients and inserting the eleven correlation coefficients, between the traits and the criterion, in the regression equation gave a multiple correlation coefficient

$$r_m = .905$$

IV

DISCUSSION OF RESULTS

From Fig. 4.2 it is seen that in all traits a marked bias towards the favourable end of the scale exists. This is common with subjective ratings[1] and is largely due to a tendency to rate from a zero rather than about a mean.

In the final rating a marked bimodality is shown. The last trait differed in importance from the others inasmuch as, at the time of the experiment, interviewers were asked at the end of each interview to make a decision which largely determined the fate of the candidate. This they had to do in ignorance of the quality of candidates seen by other panels. There seems to have been a

---

1. See, for example, McClelland, W., Selection for Secondary Education. London: University of London Press, 1942. Chap. 5.

tendency, therefore, to put candidates into two main categories, 'definitely acceptable' and 'definitely unacceptable', or a tendency to exaggerate the goodness of the good candidate and the badness of the bad.

A study of the rotated factor loadings shows three largely non-overlapping group factors.

Factor I has four loadings greater than .4, which is the lowest loading which Thurstone suggests (3.1 p. 79) should be used for naming a factor, namely,

5(1)	Dialect	845
6(1)	General Appearance	615
5(2)	Voice Quality	576
4.	Physical Bearing	430

This suggests a factor which might be called the Externals of Personality or Culture and gathers together those traits which make for social acceptability.

Factor II which is almost as large a contributor to the total variance as Factor I has loadings greater than .4 in

6(3)	Adjustment to Interviewers	615
8.	Suitability for Teaching	527

5(3)	Power of Expression	504
7.	Sense of Vocation	499
1.	Interests	464
6(2)	Personal Adjustment	446

This is the only factor at all heavily weighted with both Suitability for Teaching and Sense of Vocation, and this, considered in relation to the other main headings of Adjustment, Power of Expression and Interests, suggests that it can probably be identified as the main 'All round Teaching Suitability' factor. It throws an interesting light on what interviewers consider to be the important traits in potential teachers. Of particular interest is the heaviest loading of all, 'Adjustment to Interviewers', which appears in no other factor. This would seem to provide some evidence in support of the frequently expressed opinion that panels select candidates in their own image.

The remaining factor III has heaviest loadings in

3.	Physical Activities	649
2.	School Activities	443
4.	Physical Bearing	422

The appearance of Physical Bearing in this group is probably due to its close association in the minds of the interviewers with Physical Activities. The factor suggests 'School out of class activities' as operating as a distinguishing discriminant among the interviewers.

The direct contribution of these three factors to the total variance amounts only to 36% as against 67% extracted by the centroid factors. This indicates a fair amount of correlation between the factors, or looked at in another way, a fairly large second order general factor which would almost certainly be 'halo'.

An examination of the weighting coefficients in Table 4.3 shows that three of the coefficients, those for

3. Physical Activities

6(1) Voice Quality

8. General Appearance

are not significant and that for

5. Dialect

is of doubtful significance though it would probably have just been significant if the regression equation had been recalculated omitting 3, 6(1) and

8. This grouping corresponds closely to Factor I, and although a regression equation is nothing more than a mathematical relationship, it is tempting to suggest that Factor I operated in the interview situation in this experiment but played no part in the interviewers estimate of teaching suitability.

It will be noted that 'Sense of Vocation' was the most heavily weighted trait in the regression equation, and this, though theoretically desirable, is in some ways disappointing. One would not have expected interviewers to place so much reliance upon what must, in many cases, be a stock answer to a stock question. In justice it must be noted that this rating was the penultimate one and was probably largely a reflection of the last trait which may retroactively have determined it.

V

SUMMARY

In an experiment in which 420 young men and women were interviewed for admission to the University of Birmingham Education Department three factors seem to have been operating

I The Externals of Personality or Culture

II All round Suitability for Teaching

III School out of class Activities

There was also evidence of a general factor of halo. There was a suggestion that the first factor carried little weight in the final assessment of teaching suitability.

SECTION B. ANALYSIS OF HEAD TEACHERS' RATINGS

I

PURPOSE OF EXPERIMENT

The purpose of the experiment was to determine how Head Teachers grouped certain traits which they were asked to consider when recommending candidates as potential teachers.

II

EXPERIMENTAL DESIGN

The Sample a. Candidates. The sample consisted of 196 candidates (117 men and 79 women) who had applied for admission to the University of Birmingham Education Department in 1949 as four year students. This particular set of candidates lived within a 30-40 mile radius of Birmingham and were selected because it was possible to call them in for certain supplementary tests which were required for Section C of this chapter.

b. Head Teachers. The Head Teachers were the Heads of the various Grammar Schools at which the candidates were pupils at the time of

application. They constituted a particularly heterogeneous group working in ignorance of each others standards and this created a source of unreliability in the data which it was not possible to correct statistically since the number of applicants from any one school was never more than six. The Head Teachers were, however, given certain instructions in the use of the rating schedule described below, and most of them, having regularly presented candidates to the University, were practiced in its use.

The Rating Schedule. The rating schedule (Appendix II) was in the nature of a confidential report on the candidate and was seen only by the Head Teacher and the University. It sought information under seven headings:

1. Intellectual Interests
2. Part played in School Activities and Social Life of School.
   (i) Offices held and responsibility given
   (ii) General Social Life
   (iii) Sports and Athletics
3. Speech
4. Personality
   (i) Leadership
   (ii) Personal Adjustment
   (iii) Adjustment to Others

5. General Suitability for Teaching

6. Order of Merit among those applying from the School

7. Further Comment.

A five point A to E rating scale was provided against all the sections except 2(i), 6 and 7, and the extremes of the scales were defined. Thus, for example, under 4(ii) appeared

Personal Adjustment

A B C D E

Excellent, Confident, Amiable, Well-balanced, Stable. — Poor, Very Nervous Anxious

Head Teachers were asked to ring the appropriate letter, or two of them if doubtful, using C as corresponding to the average of all H.S.C. candidates in Grammar Schools (not merely those who wanted to teach). An indication of the normal distribution of ratings was given.

III

ANALYSIS AND STATEMENT OF RESULTS

The distribution of ratings for the eight parts of the rating schedule where an A to E scale was provided are shown in Fig. 4.3.

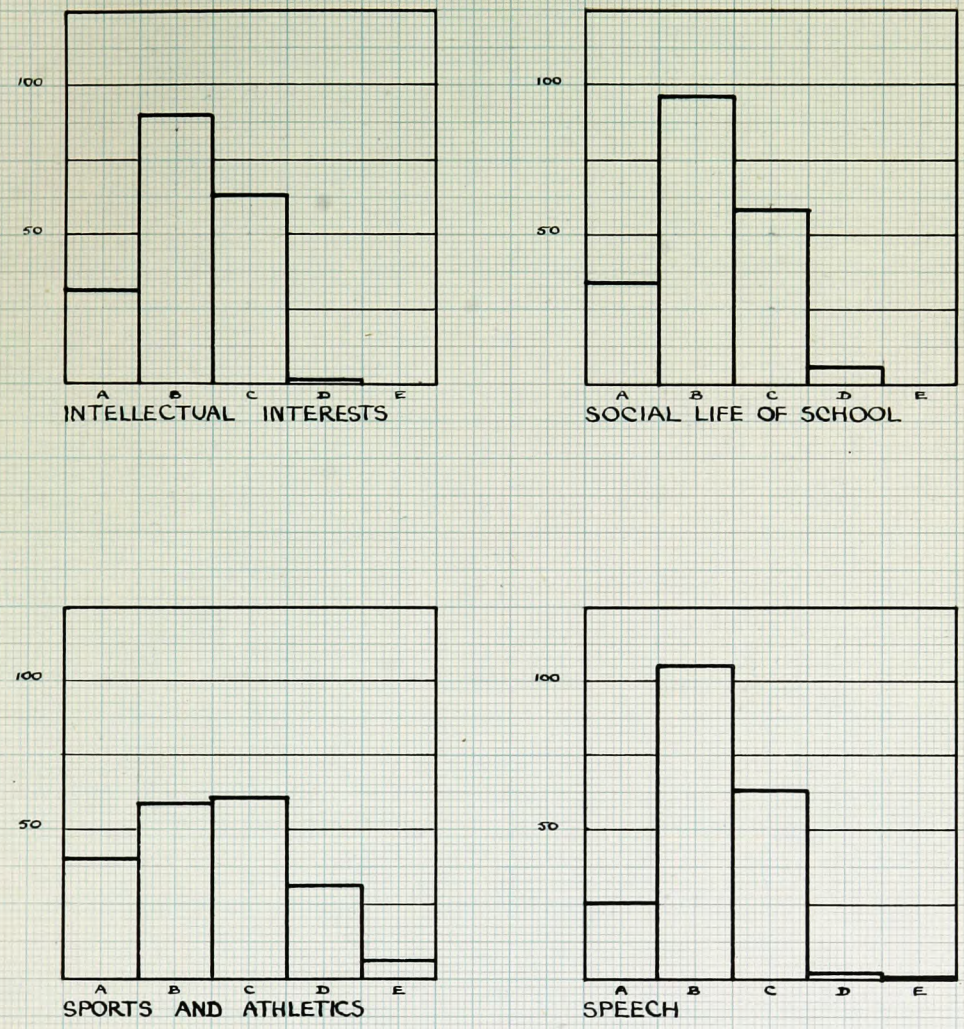

100
50
A
B
C
D
E
INTELLECTUAL INTERESTS
100
50
A
B
C
D
E
SOCIAL LIFE OF SCHOOL
100
50
A
B
C
D
E
SPORTS AND ATHLETICS
100
50
A
B
C
D
E
SPEECH

FIGURE 4·3

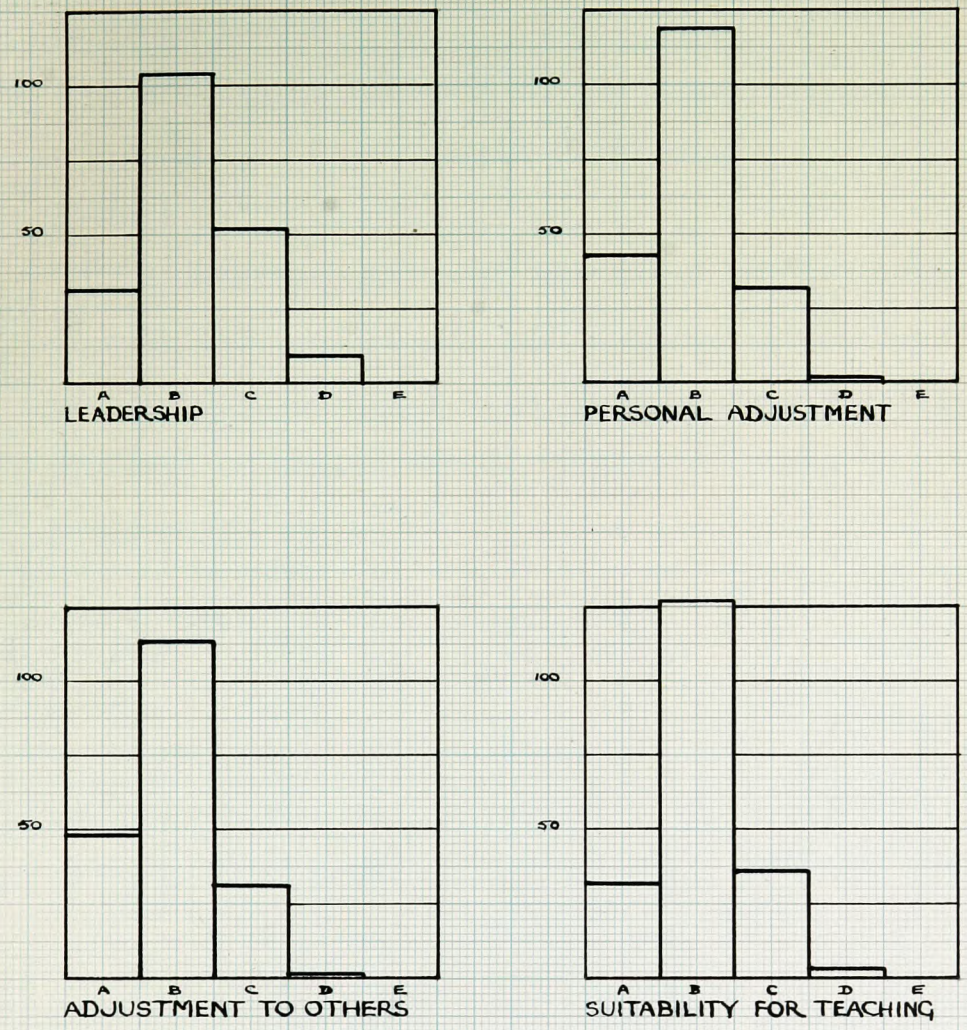

100
50
A
B
C
D
E
LEADERSHIP
100
50
A
B
C
D
E
PERSONAL ADJUSTMENT
100
50
A
B
C
D
E
ADJUSTMENT TO OTHERS
100
50
A
B
C
D
E
SUITABILITY FOR TEACHING

FIGURE 4·3

As was the case in Section A the ratings were T- scored and the trait intercorrelations calculated. The complete correlation matrix is given in Appendix II.

A centroid analysis of the correlation matrix was taken to three factors which are shown in Table 4.4.

A rotating matrix Λ was found by the method of extended vectors and post multiplication of the centroid matrix F by Λ gave oblique factors, referred to the reference vectors, as shown in Table 4.5.

$$\Lambda = \begin{vmatrix} 424 & 308 & 481 \\ -535 & 153 & 821 \\ -731 & 939 & -307 \end{vmatrix}$$

The angles between the reference vectors given by $\Lambda' . \Lambda$ were

$$\begin{vmatrix} . & 130^{o} & 91^{o} \\ 130^{o} & . & 91^{o} \\ 91^{o} & 91^{o} & . \end{vmatrix}$$

Table 4.4. - Unrotated Centroid Loadings (F)

Trait	I	II	III	h^2
1. Intellectual Interests	521	-358	-137	418
2(ii) Social Life of School	745	-041	-004	557
2(iii) Sports and Athletics	436	693	-256	736
3. Speech	578	-105	092	354
4(i) Leadership	709	-218	567	872
4(ii) Personal Adjustment	713	087	-207	559
4(iii) Adjustment to Others	608	307	-256	529
5. Suitability for Teaching	766	-327	284	774
Contribution to Total Variance	41.48%	10.96%	7.54%	
Total Variance extracted	59.98%	-	-	

Table 4.5. - Structure on the Reference Vectors ($V = F \times \Lambda$)

	Trait	I	II	III
1.	Intellectual Interests	-001	-023	513
2(ii)	Social Life of School	326	219	341
2(iii)	Sports and Athletics	857	000	001
3.	Speech	164	248	234
4(i)	Leadership	-012	717	003
4(ii)	Personal Adjustment	478	039	407
4(iii)	Adjustment to Others	623	-006	281
5.	Suitability for Teaching	013	453	292
Direct Contribution to Total Variance		18.56%	10.39%	9.55%

IV

DISCUSSION OF RESULTS

With only eight traits it was not expected that the three factors obtained by rotation would be over determined. It was found that while factors I and II were reasonably well defined factor III was somewhat arbitrary. (See Location of Axes. Appendix II). Nevertheless the existence of this factor seemed beyond doubt, for any reasonable position of the line representing the intersection of the hyperplane with the plane tangential to the first centroid axis gave a factor with its heaviest loading in trait 1. In the given case this line was drawn joining trait 4(i) and 2(iii). (See Appendix II.)

Factor I has loadings greater than .4 in

2(iii) Sports and Athletics	857
4(iii) Adjustment to Others	623
4(ii) Personal Adjustment	478

with a somewhat smaller loading in

2(ii) Social Life of School	326

There is a certain similarity between this factor and that identified as operating in the

interview (Section A) and called School out of class Activities. The additional loadings for adjustment show how, in the eyes of Head Teachers an active part in activities outside the classroom determines the candidate's social acceptability and balance. In this factor are seen the traits which, making for popularity, would lead to the candidate being described as a 'good type'. There is more than a little suggestion of extraversion here.

Factor II has heaviest loadings in

4(i)	Leadership	717
5.	Suitability for Teaching	453

a poorly defined factor which can only be vaguely defined as the leadership aspect of Teaching. This may well be a factor to which many people give some weight. It shows a higher loading for Suitability for Teaching than any other factor though there is a certain loading for this trait in factor III

Factor III has its heaviest loadings in

1.	Intellectual Interests	513
4(ii)	Personal Adjustment	407

with smaller, though probably significant loadings

in

2(ii)	Social life of School	341
5.	Suitability for Teaching	292
4(iii)	Adjustment to Others	281

This factor has much in common with Factor I except that whereas Factor I is dominated by Sports and Athletics Factor III is dominated by Intellectual Interests. This factor, therefore, seems to be concerned with the well-balanced intellectual type of person rather than with the well-balanced athletic type and Factors I and III considered together suggest that the old dichotomy between the two types clearly exists in the minds of Head Teachers. It is interesting to note that, of the two, only Factor III has a loading for Suitability for Teaching.

The three factors make a direct contribution to the total variance of 38.5% compared with nearly 60% extracted by the centroid factors. They thus overlap or alternatively there remains a fairly large general factor which is most likely to be halo.

The difficulty experienced in defining these factors is in part due to the small number of

traits from which they have been determined and in part from the overlapping of the factors themselves. Thus, Social life of School appears in each factor, though in none at all heavily weighted, as also does Speech. This latter has, as might be expected, its smallest loading in Factor I. The lack of clear-cut group factors may also be due to the heterogeneous sample of Head Teachers who completed the rating schedule.

Two points, however, seem beyond reasonable doubt. First, that a division between Intellectual and Athletic ability is made by the Head Teachers and second, that a larger part of the Head Teacher's report is determined by prowess in the second ability than by prowess in the first.

V

SUMMARY

In the experiment 196 men and women applicants for admission to the University of Birmingham Education Department in 1949 were reported on by their Head Teachers in a prescribed manner.

An analysis of the reports indicates the

existence of three group factors:

1. Well-balanced athletic and social type
2. Leadership aspect of Teaching
3. Well-balanced intellectual type

Suitability for Teaching entered into Factors I and III only, but the dominant influence in the report was Factor I.

SECTION C. COMPARISON BETWEEN INTERVIEW RATINGS, HEAD TEACHERS' RATINGS AND CERTAIN TEST RESULTS

I

PURPOSE OF EXPERIMENT

The purpose of the experiment was to determine the degree of overlap between Interview ratings and Head Teachers' reports and to find whether any factors operating jointly or separately in the two schedules overlapped certain test performances.

II

DESIGN OF EXPERIMENT

Sample. The sample consisted of the 196 candidates living within 30-40 miles of Birmingham, previously considered in Section B.

Procedure. The candidates, having applied for admission to the University of Birmingham Education Department, were reported on confidentially by their Head Teachers in the manner described in Section B. They were then called forward twice, once in two batches of approximately 100 for certain written tests and once in batches of six or so for interview in the manner described in

Section B. All candidates were seeking admission to the University and were therefore fully motivated.

Tests. The written tests given to the candidates were

1. N.I.I.P. Group Test 33
2. Relation-Completion Test
3. Adult Reasoning Test

Test 1 is sufficiently well known as to need no description. Tests 2 and 3 are due to Professor C.W. Valentine. Copies of all the tests are shown in Appendix III.

The Relation-Completion test consisted of two paragraphs from which certain words, prepositions, conjunctions and adverbs had been omitted. The testee was provided with a list of words from which to select those most appropriate to the sense of the paragraphs. The test had a maximum score of 23 and a test-retest reliability of .74 ± .13.

The Adult Reasoning Test was in ten sections. Each section, except the last, was of the form

If A then B

B True	B False
	because
	C
	or D
	or E
	or F

Section 10 was of the form

If A then B and C

B True	B False	C True	C False
	because		because
	D		P
	or E		or Q
	or F		or R
	or G		or S

The testees were required to indicate

1. If the conclusion was True or False

2. In the case where the conclusion was false, the appropriate reason why it was false.

These two parts were scored separately and the marks added. The maximum mark was 16 and the test-retest reliability .51 ± .13.

It may be noted here that, after allowance had been made for guessing, many of the candidates obtained a negative score. This lack of a sufficient number of easier items coupled with low reliability in the only case where it could be

determined, led to the abandonment of this particular test in later work.

III

ANALYSIS AND STATEMENT OF RESULTS

The distribution of test scores, is shown in Fig. 4.4. Owing to the fact that different aspects of Intelligence were called into play by the different sub-tests of the Intelligence Test, Group Test 33, each of these sub-tests was handled as a separate test.

The analysis consisted of a centroid analysis of the matrix

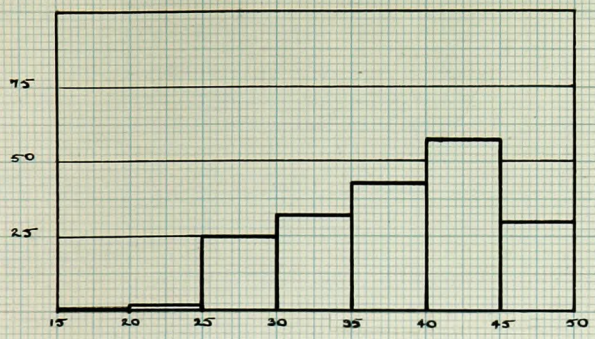
$$\begin{vmatrix} R_I & R_{IH} & R_{IT} \\ R'_{IH} & R_H & R_{HT} \\ R'_{IT} & R'_{HT} & R_T \end{vmatrix}$$

where R represents a correlation sub-matrix and

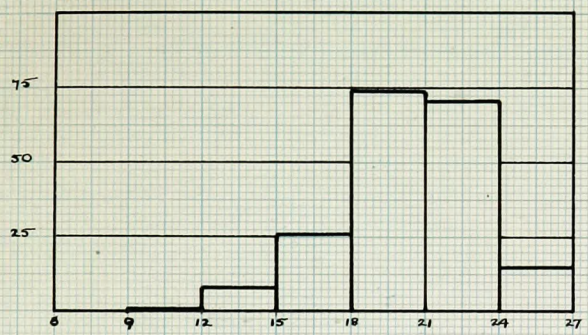
I,H,T refer to correlations derived from Interviews, Head Teachers' reports and Tests respectively.

The full matrix is given in Appendix III.

Five factors were extracted, the fifth being of doubtful significance and being retained only



GROUP TEST 33 PART 1



GROUP TEST 33 PART 2

GROUP TEST 33 PART 3

GROUP TEST 33 PART 4

FIGURE 4-4

GROUP TEST 33 PART 5

ADULT REASONING TEST

RELATION – COMPLETION TEST

FIGURE 4-4

for the extra dimension it allowed in the subsequent rotation. The centroid loadings are shown in Table 4.6.

In view of the heterogeneity of the battery, consisting, as it did, of subjective ratings derived from different sources and written test material, it was decided to seek only broad general groupings of the 'tests' without invoking any elaborate rotational technique. Simple two-by-two orthogonal rotations were made and even with this simple technique a reasonable approximation to simple structure was obtained. It was clear from a study of the two-by-two diagrams that an even better approximation would have been secured with oblique transformations.

Twelve rotations were made of which only four were necessary for the complete orthogonal transformation. (Appendix III). The rotated factor matrix is shown in Table 4.7.

IV

DISCUSSION OF RESULTS

Correlations. It is interesting to study the

Table 4.6. - Unrotated Centroid Loadings (F).

Trait or Test	I	II	III	IV	V	h^2
Interview						
1. Interests	656	187	-261	181	109	578
2. School Activities	708	209	221	101	141	624
3. Physical Activities	400	154	550	422	003	664
4. Physical Bearing	671	303	074	245	-139	627
5(1) Speech - Dialect	554	222	-353	-148	105	514
5(2) Voice Quality	740	316	-195	-156	005	710
5(3) Power of Expression	689	278	-346	-022	-063	676
6(1) General Appearance	602	408	-125	193	-086	589
6(2) Personal Adjustment	665	341	-152	101	-118	606
6(3) Adjustment to Interviewers	710	417	-220	-003	-277	803
7. Sense of Vocation	580	353	-283	122	-103	567
8. Suitability for Teaching	837	329	-229	139	-087	888
Head Teacher's report						
1. Intellectual Interests	364	054	154	-457	177	399
2(ii) School Social Life	549	070	497	-299	326	750
2(iii) Sports and Athletics	324	-050	682	-296	193	697
3. Speech	524	-182	044	531	182	625
4(i) Leadership	594	-086	321	-160	205	531
4(ii) Personal Adjustment	425	-139	419	-339	-506	746
4(iii) Adjustment to Others	437	-051	376	-094	-048	346
5. Suitability for Teaching	580	-157	301	-375	004	592
Tests						
Gp. Test 33 Pt. 1.	178	-523	-296	-053	159	421
2.	237	-449	-322	199	146	422
3.	171	-480	-264	045	-033	332
4.	250	-614	-288	229	-125	591
5.	192	-379	-072	254	060	254
Relation-Completion Test	140	-251	-152	-078	261	180
Adult Reasoning Test	175	-267	-068	162	164	160
Contribution to Total Variance	27.25%	9.51%	9.45%	5.78%	3.16%	
Total Variance extracted	55.15%					

Table 4.7. - Orthogonal Structure (F.Λ)

Trait or Test	I	II	III	IV	V	h^2
Interview						
1. Interests	682	007	192	273	-018	577
2. School Activities	487	331	049	503	144	623
3. Physical Activities	079	105	-132	732	306	664
4. Physical Bearing	584	053	-003	416	330	626
5(1) Speech - Dialect	677	165	148	-040	-075	515
5(2) Voice Quality	774	284	096	076	121	709
5(3) Power of Expression	795	073	154	046	113	676
6(1) General Appearance	690	-014	-061	268	191	588
6(2) Personal Adjustment	713	052	031	204	227	605
6(3) Adjustment to Interviewers	818	062	005	062	355	803
7. Sense of Vocation	727	-053	025	122	143	567
8. Suitability for Teaching	865	058	136	266	217	888
Head Teacher's report						
1. Intellectual Interests	203	595	059	-032	-004	400
2(ii) School Social Life	166	760	018	377	039	749
2(iii) Sports and Athletics	-145	727	-089	346	165	697
3. Speech	247	-124	361	646	-006	624
4(i) Leadership	206	551	224	356	094	532
4(ii) Personal Adjustment	012	449	170	-015	718	746
4(iii) Adjustment to Others	088	395	112	286	297	346
5. Suitability for Teaching	169	630	285	126	262	591
Tests						
Gp. Test 33 Pt. 1.	003	006	612	-071	-203	421
2.	095	-174	581	105	-185	422
3.	005	-112	563	-054	-022	333
4.	003	-258	718	059	072	591
5.	-025	-134	427	229	-028	254
Relation-Completion Test	045	113	320	007	-251	180
Adult Reasoning Test	019	-040	323	195	-126	160
Contribution to Total Variance	21.89%	10.83%	8.80%	8.39%	5.22%	
Total Variance extracted	55.13%					

correlations between various traits considered by both Interviewers and Head Teachers. These are to be found in the sub-matrix R_{IH} which is repeated in Table 4.8.

The highest correlation in the table is between Physical Activities and Sports and Athletics. (The Interview trait is quoted before the Head Teacher's trait throughout). The extent of this agreement ($r = .714$), coupled with the fact that Head Teachers can almost certainly assess the trait more reliably than Interviewers, suggests that a separate assessment of this by Interviewers is superfluous.

The only other correlations greater than .5 are between School Activities and School Social Life ($r = .586$) and School Activities and Leadership ($r = .531$). In both of these fairly high correlations would be expected. In most other cases where comparable qualities are being assessed the correlations are very low, as, for example, between Interests and Intellectual Interests ($r = .218$). The three Speech ratings, Dialect, Voice Quality and Power of Expression with Speech ($r = .338$, .411 and .369 respectively) suggest that speech, a

Table 4.8. - Correlations between Interview ratings and Head Teachers' ratings

Head Teachers' report	1. Intellectual Interests	2(ii) School Social Life	2(iii) Sports and Athletics	3. Speech	4(i) Leadership	4(ii) Personal Adjustment	4(iii) Adjustment to Others	5. Suitability for Teaching
Interview								
1. Interests	218	246	046	271	395	000	095	196
2. School Activities	308	586	329	322	531	383	250	326
3. Physical Activities	-035	365	714	000	328	162	282	246
4. Physical Bearing	113	292	303	239	333	217	299	299
5(1) Dialect	194	191	-060	338	142	075	091	198
5(2) Voice Quality	222	294	097	411	369	217	367	356
5(3) Power of Expression	236	236	040	369	267	124	061	266
6(1) General Appearance	116	188	184	182	188	126	155	201
6(2) Personal Adjustment	125	237	122	260	349	192	202	235
6(3) Adjustment to Interviewers	274	243	100	311	325	216	189	316
7. Sense of Vocation	179	135	030	078	166	127	096	202
8. Suitability for Teaching	210	322	100	357	302	186	364	294

product of local culture, which is acceptable in one area is not acceptable in another. Remarks such as "Speaks with a pronounced Liverpool accent" have often been observed on Interview forms in use at Birmingham. Doubtless Liverpool University deplores the fact that some of its applicants speak with pronounced Birmingham accents. It is probable that any dialect is acceptable in some regions and unacceptable in others and it seems doubtful whether such a trait should carry any great weight in an interview.

Both corresponding adjustment correlations are low ($r = .192$ and $.189$) which may be due to lack of adequate definition or, more likely, the impossibility of judging so complex a quality in an interview. Such a quality is probably highly specific to the particular situation in which it is being expressed, and the brief and artificial interview situation may give wholly unreliable evidence as to its nature.

Most disappointing of all is the correlation for Suitability for Teaching ($r = .294$). If this had been due to the heterogeneous sample of Head Teachers one would not have expected other corre-

lations such as that for Sports to be high. A natural desire of Head Teachers to do the best for their pupils would have lifted the mean and narrowed the range of marks but would not seriously have affected the correlation. It seems most probable that Teaching Suitability is a quality for which there are few clear and agreed determinants and that both Interviewers and Head Teachers were judging within the framework of their own opinions and were looking in different directions as they did so.

It is appropriate to observe here that correlations for Teaching Suitability over the three years 1948, 1949 and 1950 have been

1948	.202
1949	.294
1950	.314

showing a small but welcome rise which suggests that Head Teachers are becoming more used to their rating schedule and that this is permitting a more uniform expression of opinion.

Factor Analysis. Factor I has heaviest loadings in

Interview.	Suitability for Teaching	865
	Adjustment to Interviewers	818
	Power of Expression	795
	Voice Quality	774
	Sense of Vocation	727
	Personal Adjustment	713
	General Appearance	690
	Interests	682
	Dialect	677
	Physical Bearing	584
	School Social Life	487

and then no other loading higher than

Head Teacher. Speech 247

The factor is concerned solely with Interview performance and includes every Interview assessed trait except Physical Activities. It shows again the close relationship between Suitability for Teaching and Adjustment to Interviewers noted in Section A. The complete absence of any overlap with Head Teachers' report and Test results is disappointing but not surprising.

Factor II, having its heaviest loadings in

Head Teacher.	School Social Life	760
	Sports and Athletics	727
	Suitability for Teaching	630
	Intellectual Interests	595
	Leadership	551
	Personal Adjustment	449
	Adjustment to Others	395

is, similarly, concerned solely with the Head Teachers' report. Whereas, however, in Factor I Suitability for Teaching dominated the factor, in

II it is School Social Life followed by Sports and Athletics which carry most weight. It is possible that this is symptomatic of a difference of outlook conditioned by a difference of motivation. One group is taking candidates in at the beginning of one career while the other is sending them out at the end of another. The Interviewers are selecting potential teachers and the Heads recommending good types of pupils. In doing so the former must be most affected by what they judge to be teaching suitability and the latter more by the social qualities which make a good mixer.

Factor III is concerned chiefly with performance in the Intelligence Test. Its loadings are

Group Test 33	Pt. 4	718
	1	612
	2	581
	3	563
	5	427

This is the only factor in which the two other tests have reasonable loadings

Adult Reasoning Test	323
Relation Completion Test	320

and the factor is therefore one of written test performance which a Head Teacher's Speech loading

of 361 suggests is a rather verbal one.

Factor IV has highest loadings in

Interview	3.	Physical Activities	732
Head	3.	Speech	646
Interview	2.	School Activities	503
Interview	4.	Physical Bearing	416
Head	2(ii)	School Social Life	377
Head	4(i)	Leadership	356
Head	2(iii)	Sports and Athletics	346

This is an entirely non-cognitive factor which may perhaps be labelled 'Social Acceptability'. It has several interesting features. First, although Head Teachers' rating for Speech appears, none of the corresponding interviewer speech assessments have any significant loadings. The social acceptability is therefore one that seems to operate within a local culture pattern at least as far as its speech element is concerned. Second, it is the only factor showing any overlap between Interviewers and Head Teachers. This overlap exists only for certain fairly easily defined traits, other than speech, and does not extend to Interests, Adjustment or Suitability for Teaching. Since such traits as Physical Activities, School Social Life, etc., are probably more reliably assessed by Head Teachers with the wealth of evidence available to them, it would seem reasonable to

leave the estimation of traits within this factor to them.

Factor V has only one high loading

Head Teacher	4(ii)	Personal Adjustment	718

though there are a few borderline loadings

Interview	6(3)	Adjustment to Interviewers	355
Interview	4.	Physical Bearing	330
Interview	3.	Physical Activities	306
Head Teacher	4(iii)	Adjustment to Others	297

reminiscent of the factor, 'well adjusted social and athletic type' of Section B, and suggestive of emotional and physical balance. The factor, as it stands, is, however, badly defined and in any case the original centroid analysis was carried to a fifth factor only to help the rotation.

V

SUMMARY

In the experiment 196 men and women who were applicants for admission to the University of Birmingham Education Department were reported on by their Head Teachers, given certain tests and interviewed.

Correlations between corresponding traits differently assessed and measured were generally

low. Correlations for Sports were an exception to this.

A factor analysis gave four main orthogonal factors

I Interview performance

II Head Teacher's report performance

III Test performance

IV Social Acceptability

with bare indications of a fifth

V Emotional and Physical Balance

In the last two factors only was there any marked overlap between Head Teachers and Interviewers. Test performance failed to overlap anything else.

SECTION D. A COMPARISON BETWEEN DIFFERENT INTERVIEWERS USING A RATING SCHEDULE

I

PURPOSE OF EXPERIMENT

The purpose of the experiment was to enquire into the extent of the agreement which might be obtained from the use of a rating schedule, by finding which parts of the schedule gave rise to agreement and which to disagreement among interviewers.

II

DESIGN OF EXPERIMENT

The design selected for this experiment was a six by six Latin Square of the type shown in Fig. 4.5 in which six interviewers interviewed six candidates at six times randomised within the block.

The break-down of sums of square within such a block gives

Source of Variance	Degrees of Freedom
Between Candidates	5
Between Interviewers	5
Between Times	5
Error	20
Total	35

Fig. 4.5. - Latin Square design of Experiment D

Interviewer	A	B	C	D	E	F		Times
Candidate P	5	1	2	4	3	6	1	10.00 a.m
Q	3	4	6	1	5	2	2	10.30 a.m.
R	2	5	4	6	1	3	3	11.10 a.m.
S	6	2	5	3	4	1	4	11.40 a.m.
T	1	6	3	5	2	4	5	2.00 p.m.
U	4	3	1	2	6	5	6	2.30 p.m.

There are two main approaches to design in the present problem.

1. One may interview a large number of candidates twice or more and compare the results of the interview by an analysis of variance.

2. A large number of interviewers can separately interview the same few candidates.

Even supposing that any department had the time and patience to undertake the first method, the number of candidates necessary to secure a result comparable with the 6 x 6 Latin Square would be very great. With 5 degrees of freedom between Interviewers and 20 for error an F ratio of 2.71 (4.3 pp. 62-65) would indicate a significant difference at the 5% level. With n repetitions of the complete batch of interviews the number of

degrees of freedom associated with the error variance which would give significance for F = 2.71 is shown in Table 4.9.

Table 4.9. - Degrees of freedom required for error variance corresponding to F = 2.71 with different numbers of interviews

No. of Interviews	Degrees of Freedom
2	∞
3	∞
4	90
5	28
6	20

Thus, with a design using a straightforward analysis into three components:

Between candidates	n - 1
Between interviewers	r - 1
Error	(n-1)(r-1)
Total	nr - 1

repetition of the interview two or three times with the whole applicant field would never yield the required information so readily. Even four replications of the experiment would have to be conducted over 31 candidates to yield comparable information. Further, the Latin Square allows a

source of error to be eliminated, namely the variance due to time, and if, for strict comparison between the above method and the Latin Square, this variance is lumped with the error variance, the Latin Square design is seen in an even more favourable light.

The second approach has serious limitations since there is not only a limit to the number of interviews a candidate can endure but there is also a limit to the number during which he can feel fully and seriously motivated. Beyond this number the procedure becomes unreal and unreliable especially when the candidate realises he is being used for experimental purposes.

A six by six Latin Square was therefore selected as a reasonable compromise, six interviews being the number an interviewer was called upon to do in a single day's interviewing in the ordinary course of the work, and being about the most a candidate could be expected to endure.

The Candidates. Six candidates who had applied for admission to the Education Department, who had been interviewed in the ordinary way some two or three months earlier but who had not yet been

notified of acceptance or rejection were selected from schools in the Birmingham area. The sample was a controlled sample (4.3 pp. 5-7, 157-163) but since the total number of candidates was small and the candidates chosen to fit the population distribution of Suitability for Teaching of Section A, it was treated as a random sample. The candidates were three men and three women whose final gradings at their original interviews were

	Candidate	Original Final Rating
Woman	P	A/B
"	Q	C-
"	R	C+
Man	S	B
"	T	D
"	U	C

The Head Teachers of the six candidates were told of the purpose of the experiment, namely that it was a check on departmental interview procedure but were asked to withhold this information from the applicants. The applicants were asked to attend the University for a further set of interviews in support of their application and original interview.

The Interviewers. The six interviewers, three men and three women, were invited to take part in the experiment by the Professor of Education. They were selected by him on the basis of their experience and were well versed in the use of the interview schedule. So that there should be no feeling that they were on trial as individuals they were identified only by letters randomly allocated by one of their number. The interviewers by sex were

Interviewer	Sex
A	F
B	F
C	M
D	M
E	M
F	F

The nature and purpose of the experiment was explained to the interviewers. They were asked to conduct each interview, for which thirty minutes would be allowed, in any way which best suited them provided that they finally had sufficient data to complete an interview schedule for each candidate. The original ratings given to the candidates were

not divulged.

It may be observed here that the work, which involved a whole day's interviewing, was undertaken with great enthusiasm by the interviewers and was appreciated by the candidates as having given them a very full and fair chance of displaying their talents. Several of the candidates expressed their preference for the tete-a-tete interview. Some interviewers found the work heavier than panel interviewing; others expressed a preference for it.

Interview Schedule. The schedule already described in Section A of this chapter was used in the present experiment.

III

ANALYSIS AND STATEMENT OF RESULTS

The allocation of grades to each candidate by each interviewer for each trait is shown in Table 4.10. Alongside each square is noted the grades given at the original interviews.

The grades were converted to marks by using the T- scores calculated for the larger sample

INTERESTS

	I	II	III	IV	V	VI	
P	A/B	B	A	B/C	A	A	A
Q	B	B	B/C	B	B	B/C	C
R	B	C	B-	B	B	B	B/C
S	B	B	B	B	B	B	A/B
T	C/D	C	D	D	D	D	E
U	B/C	C+	B	B	B	B	C/D

SCHOOL ACTIVITIES

P	A/B	B-	A	B	A/B	A/B	A/B
Q	B	C	B	B	B	C	C
R	A/B	B	B-	A	B	B	B
S	A/B	A	B	A	A	A/B	A
T	B/C	C	C	C	D	C	D
U	C	D	C+	C	C	C/D	C

PHYSICAL ACTIVITIES

P	A	A	A	A	A	A	A
Q	B/C	C	B	D	C	C	C
R	B	B	C	B	C	B	B
S	B	D	C	C	C	C	D
T	B/C	C	C/D	C	C	B	C
U	C/D	E	C-	D	D	D	E
	I	II	III	IV	V	VI	

TABLE 4.10

PHYSICAL BEARING

	I	II	III	IV	V	VI	
P	A	B-	A	B	B	B	A/B
Q	B/C	B	B/C	C	C	B/C	C
R	B	C	C	B/C	C	B/C	B
S	B	C	C+	C	C	C	B/C
T	B/C	C	C/D	C	C	C	C/D
U	B/C	C	C	B	C	D	C/D

DIALECT

P	A/B	A	B	B	A	B	A
Q	B	B	C-	B/C	C/D	C	C/D
R	B	C	C	B/C	C	C	C
S	B	B	B	B	B	B	B
T	B/C	C	D	D	D	C/D	D
U	C	C	C+	C	B	C/D	D+

VOICE QUALITY

P	A/B	B	B	B	C	B	A
Q	B	C	C	C	C	B/C	C
R	B	C	B	C	C	C	C
S	B	C	B	B	C	C	B/C
T	B	C	D	C	C	C	D
U	C	C	C	C	C	C	C
	I	II	III	IV	V	VI	

TABLE 4·10

POWER OF EXPRESSION

	I	II	III	IV	V	VI	
P	A/B	B	B	B	B	A	A
Q	B	B	B	B/C	C	C	B
R	B	C	B-	B	B	C	B/C
S	A/B	B	B	B	B	B	B
T	B	C	D	D	C	D	D
U	B/C	C	C+	B	B	C	D

GENERAL APPEARANCE

P	A/B	C+	B	B	B	B	B
Q	B	C	B-	C	B/C	B	C
R	B	C	B-	C	C	C	C
S	A	B	B	B	C	C	B
T	B/C	B	C-	C	C	C	C
U	B/C	C-	C	B	C	C/D	C/D

PERSONAL ADJUSTMENT

P	A/B	B	B	A/B	A	A	A
Q	B/C	B	B	B/C	C	B/C	B/C
R	B	B	B-	B	B	B	B/C
S	A/B	B	B	B	B	B	B
T	B/C	C+	C-	C	C/D	C	D
U	B/C	B	C+	B	B	C	C
	I	II	III	IV	V	VI	

TABLE 4-10

ADJUSTMENT TO INTERVIEWERS

	I	II	III	IV	V	VI	
P	A/B	B	B	B	B	A	A
Q	B	B	B	C	C+	B	B/C
R	B	C	B-	B	B	B/C	B/C
S	A/B	B	B	B	B	A/B	B
T	B/C	C	C-	C/D	C/D	C/D	D
U	C	C	C+	B	A/B	B/C	C

SENSE OF VOCATION

P	B	C	B	B	B	A	B
Q	B	C	C	B	C	C	D
R	B	C	C+	C	B	B/C	B/C
S	B	B	C	B	B	B	B
T	C	B	C-	C/D	C	D	D
U	C	C	C-	C	B	C	C+

SUITABILITY FOR TEACHING

P	A/B	B	B+	B	A/B	A/B	A/B
Q	C+	C+	B	C+	C+	C+	C-
R	B	C+/C	C+	B/C+	C+	C+	C+
S	A/B	B	B	B	B	B	B
T	C+	C+	D	C-	D	C-	D
U	C+	C	C+	C+	C+	C	C
	I	II	III	IV	V	VI	

TABLE 4-10

dealt with in Section A.

A typical square and its analysis are given for trait 4, Physical Bearing in Tables 4.9a and 4.9b. From these it can be seen that there is a significant difference (at 5% level) between Interviewers but not between Times. The totals for interviewers show, and the t- test confirms, that the significant interviewer difference is entirely due to Interviewer A.

The analysis for the remaining eleven squares is given in Appendix IV.

A summary of the results is shown in Table 4.11

The total marks awarded by each Interviewer were

Interviewer	A	4119
	B	3655
	C	3691
	D	3754
	E	3725
	F	3692

Table 4.9a - Marks allocated for Physical Bearing

Interviewer / Candidate		A	B	C	D	E	F	Σ for Cands.	Σ for Times
	P	72	53	72	58	58	58	371	281
	Q	52	58	52	44	44	52	302	328
	R	58	44	44	52	44	52	294	286
	S	58	44	49	44	44	44	283	300
	T	52	44	36	44	44	44	264	286
	U	52	44	44	58	44	33	275	308
Σ for Ints.		344	287	297	300	278	283	GT 1789	

GT x GM 88,903

Table 4.9b - Analysis of 4.9a

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	1,212	5	242.4
Interviewers	478	5	95.6
Times	264	5	52.8
Error	558	20	27.9
Total	2,512	35	

For Interviewers $F = \frac{95.6}{27.9} = 3.43$

For Times $F = \frac{52.8}{27.9} = 1.89$

With d.f. 5 and 20, F = 2.71 for significance at 5% level

Table 4.11 - F ratios for different parts of interview schedule

Trait		F between Interviewers	Significant at 5% level	F between Times	Significant at 5% level
1.	Interests	.53	No	.87	No
2.	School Activities	1.46	No	.65	No
3.	Physical Activities	1.44	No	.17	No
4.	Physical Bearing	3.43	Yes	1.89	No
5(i)	Dialect	2.29	No	1.20	No
5(ii)	Voice Quality	3.46	Yes	.29	No
5(iii)	Power of Expression	3.32	Yes	4.03	Yes
6(i)	General Appearance	3.79	Yes	2.62	No
6(ii)	Personal Adjustment	.96	No	2.12	No
6(iii)	Adjustment to Interviewers	1.38	No	3.22	Yes
7.	Sense of Vocation	1.16	No	1.58	No
8.	Suitability for Teaching	2.82	Yes	4.02	Yes

The total marks awarded at each time were

Time 1	3752
2	3830
3	3699
4	3685
5	3630
6	4040

These values are shown graphically in Fig. 4.6.

Reduction of each square to a two by two table for analysis of sex differences gave no significant differences in any case.

IV

DISCUSSION OF RESULTS

Referring to Table 4.11 it is seen that the traits in which the Interviewers showed significant difference are

Physical Bearing

Voice Quality

Power of Expression

General Appearance

Suitability for Teaching

In each case the difference was due to the generosity

FIGURE 4-6

of Interviewer A (Appendix IV). The other five interviewers show very close agreement.

It has been noted earlier (Section A) that Physical Bearing, Voice Quality and General Appearance form the larger part of a single factor called 'Externals of Personality or Culture', and that Suitability for Teaching show, respectively, the second and third heaviest loadings in the factor dominated by Adjustment to Interviewers. Two suggestions can therefore be made. First, that the traits associated with superficialities, usually the products of a local culture, are not entirely suitable as discriminants in an interview[1]. Second, that there is at least a need to be aware of the point, which will be developed later, that the interpersonal forces developed in an interview may affect the ratings given for a trait as much as the existence of the trait itself in the candidate. In view of the fact that only a single experiment was carried out and that one interviewer alone was res-

1. In this connection Vernon and Harrys (2.1 p. 145) state "The belief in external signs of personal traits (particular features, type of build, gestures, speech, dress etc.) is highly delusive".

ponsible for the differences found, these suggestions must be considered as tentative.

Significant differences between times were shown in the ratings for

Power of Expression

Adjustment to Interviewers

Suitability for Teaching

Significant differences between times means that the average interviewer, interviewing the average candidate, gives marks which vary at different times of the day. In each of the traits above the final interview of the day was the one productive of the difference and even in the traits where the difference was not significant the tendency was still there. In each case a plot of the ratings given during the day showed a similar form to that in Fig. 4.5 i.e. usually a slight rise in the first part of the curve followed by a fall to the penultimate interview in which fewest marks were awarded, and finishing with a steep rise to the final and highest point of the curve. The similarity between this and fatigue curves is close.

If this effect is due to fatigue it may be due to fatigue in the interviewers, fatigue in the

candidates or both. If the candidates were getting tired one would certainly expect Power of Expression to be the worst sufferer. The case of Adjustment to Interviewers suggests possibly an increasing tension in the inter-personal forces at work, a tendency for the interviewers to be less able, through tiredness, to see the candidate in the best light and for the candidate to be less able to present himself in the same way.

The difference in Suitability for Teaching, following on that for Adjustment to Interviewers, seems to be in accordance with the point made earlier (Section A.), that interviewers, particularly in their judgements of this trait, use themselves as a norm. If they find themselves getting along well with the candidate, or, as the interview schedule states and they may prefer to believe, if they judge the candidate to be well adjusted to them, they will judge him to be suitable for teaching. The same conclusion probably holds for any other major quality or ability which interviewers may be asked to assess.

It must finally be stressed that these conclusions were established on the basis of one

limited experiment operating in one particular department and they must be judged in that light. In practice, in any one year the amount of interviewing undertaken by members of the department is so great that to devote even one whole day to an experiment of this sort entails no little sacrifice. As will be described later, in the following year, when replication of the experiment might have been undertaken, the interview schedule and the form of the interview had been changed, and that temporarily prevented further work in this direction.

V

SUMMARY

In a factorially designed experiment six applicants for admission to the University of Birmingham Education Department were interviewed individually by six members of the department staff.

Using an interview schedule, five interviewers were found to agree closely on all the traits requiring to be rated. One of the six disagreed significantly on fewer than half of the traits.

Throughout the time of the experiment the marks given showed fluctuations similar to those of a fatigue curve.

CHAPTER V

THE EXTENSION OF THE ADMISSION PROCEDURE

I

INTRODUCTION

Consequent upon the tentative findings and discussion of Chapter IV it was decided in 1949 that an extended procedure might conveniently be tried experimentally for the 1950 group of candidates.

Certain limitations to the experiment were apparent. These were

1. Limited staff available for any part of the procedure additional to the interviews.

2. Lack of residential facilities which would prevent large numbers of candidates being called in together.

3. Lack of funds with which to cover the cost of candidates' residence.[1]

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1. For a description of an extended admission procedure where these limitations did not operate see Jordan,D. An experiment in Student Selection. The New Era. Vol.31 No.7 Pp 146-151. The writer was associated with this experiment.

Although a small grant sufficient to meet the cost of a one night stay in a hostel was eventually obtained, the general limitations resulted in a compression of the procedure into a single day and the supervision and marking of the written tests being undertaken completely by the investigator.

II

THE EXTENDED PROCEDURE

Candidates were handled in batches of six, each six being, in the main, candidates for the same Honours School i.e., English, Mathematics, Physics etc. Six was decided upon in view of the earlier work suggesting fatigue of interviewers.

Each batch, having been put at its ease and having had the purpose of the day's procedure explained to it, completed

1. A recordcard
2. A statement of interests

and proceeded to take

3. A General Information Test

4. N.I.I.P. Group Test 33

5. N.I.I.P. Group Test 70/23

6. A pencil and paper Situation Test

Copies of these will be found in Appendix V.

After lunch the candidates proceeded to

7. A thirty minute discussion group

8. Individual Interview

As well as the above evidence details of School Certificate and Higher School Certificate were in most cases available as well as the Head Teacher's report described in Chapter IV, Section B.

In view of the experimental nature of the procedure no information, apart from the Head Teacher's report and the interest blank, was available to interviewers. This allowed one batch of candidates to be tested in the morning and interviewed in the afternoon and a second to be interviewed in the morning and tested in the afternoon. It further allowed the interviewers' ratings to be used as a provisional criterion, pending later follow-up, with somewhat more confidence than ordinarily.

All the data, including Interviewers' opinions given on a modified interview schedule which will be described later, were finally reviewed by a

single committee, this body being the one responsible for deciding whether to accept or reject the candidate or to place him on the reserve.

III

THE TESTS

The Interest Blank. The interest blank was required to serve two functions

1. to settle the candidates by giving them something simple and straightforward to do upon arrival;

2. to economise in interview time by giving the interviewers a considered statement of the candidate's interests.

No analysis of this blank has been undertaken.

The General Information Test. This test required the matching of the names of certain people with their descriptions. Forty-eight names of political, religious, literary and other figures were given with descriptions corresponding to thirty-eight of them. All the names were of men and women who were featured frequently or recently in news, radio, cinema etc. or who, otherwise, ought

to be known to any boy or girl with a reasonable background of culture.

A time limit of ten minutes was set for the test. Scoring was by the number of correct matchings.

The split-half method, expanded by means of the Spearman-Brown prophecy formula gave a reliability for this test of ·90 ± ·01.

The Intelligence Tests. The two N.I.I.P. tests, Group Test 33 and Group Test 70/23 are too well known to need further description here. They are, respectively, a verbal and a non-verbal test of intelligence and were selected both because they were tests of which a good deal was known and because previous experience of them in the University Education Department had shown them to produce a good spread of scores.

The Situation Test. The possibility of giving some kind of practical test to the candidates was considered but rejected. It was rejected because it would have been too time-consuming, because of the proneness to subjectivity in its evaluation and because of the growing evidence suggesting that most of what can be estimated in a practical test

can equally well be judged from a pencil and paper test (2.1 p.287).

The task in the present test was to take a party of children from one town to another and back again working within certain limitations imposed by rules and regulations, time-tables etc. Each candidate was given a file of information containing maps, letters, extracts from documents and so on, from which the information necessary to the 'solution' of the problem could be obtained. The solution consisted of stating on paper

1. how such a journey would be organised, giving reasons for doing things in the stated manner rather than in any other;

2. how the time at the visited town was to be spent.

What was looked for in the answer was a sensible and reasoned approach to the problem and an awareness of the various difficulties with which it had been surrounded.

The problem was analysed by a committee of staff of the department and an analytic marking scale drawn up to cover seventeen of the twenty marks awarded for the test. The remaining three

marks were for general impression and any points missed in the analytic scale.

All the papers were marked by the same examiner and a fortnightly distribution curve drawn up so that means and standard deviations might be kept under review.

IV

THE DISCUSSION GROUP

The batch of six candidates formed the unit for discussion. The topic was introduced informally by the assessor before he noted the names of the candidates and the order in which they were sitting, thus giving them a few minutes to think round the subject before the discussion began. The subjects for discussion were left general and dealt with such matters as the relationship between the cinema and juvenile delinquency, the charge that schools dealt with unrealities, the inefficiency of democracy and so on. The assessor took no part in the discussion but sat unobtrusively in the background making such notes as he considered necessary.

Seven members of staff shared the work of

assessing, one being assigned to each batch. The seven assessors underwent previous training by sitting in on preliminary discussion groups and comparing opinions. The assessing was principally impressionistic but throughout, the assessors tried to consider each candidate for

1. quality and relevance of contribution
2. group influence

and to a lesser degree

3. amount of contribution

They finally submitted a single rating for each candidate on a five inch graphic rating scale which was subsequently converted to a score out of ten marks.

V

INTERVIEWS

Each candidate was interviewed for 20 - 30 minutes by a panel of three, constituted in the same way as described in Chapter IV Section A.

In view of the findings in that Section, and for certain other reasons, a new interview schedule was used (Appendix V) and a slightly different method of working was introduced.

The changes in working were as follows:

1. Each interviewer completed an interview schedule for each candidate instead of one joint schedule as formerly. The interviewers were asked to complete their schedules quite independently except for the final rating for Suitability for Teaching which was a joint rating based on discussion after the candidate had left the interview. This change was introduced for two reasons:

a. So that the schedules might be used during the interview instead of being left for completion after the interview. It was felt that the discussion necessary to produce an agreed rating on each of a dozen traits required more time between interviews than was available and that this might result in a hasty completion of the schedule with most of the ratings influenced by the last strong impression left by the candidate.

b. Because, as will be explained more fully later, the new interview schedule was designed to show the interviewer's personal reactions to rather than a rationalised group estimate of the candidate.

2. The interviewers were asked to pay less attention to the candidate's scholastic and athletic record, information concerning which was available from other sources such as Head Teachers' reports and known examination results, and to concentrate more on the candidate's personality as it appeared to them in the interview situation. This was a request which required the academic representative to play a less active part than formerly, a role which worried some but which all accepted with understanding of the principle behind it, viz. that the interview was being used as a means of finding whether the candidate had the necessary qualities of personality to fit him for teaching.

VI

THE INTERVIEW SCHEDULE

The new interview schedule showed two main changes from that considered in Chapter IV Section A. These changes were

1. in the traits to be rated
2. in the method of rating.

Main changes of traits. In Chapter IV Section A it

was shown that, other than a factor called School out of class Activities, there were two factors operating in the interview as then conducted, namely

I. The Externals of Personality or Culture

II. All round Teaching Suitability.

The make-up of these factors suggested the following changes which were effected in the new schedule:

1. Dialect and Voice Quality were condensed into one trait, Pleasant Voice.

2. General Appearance and Physical Bearing were condensed into Attractive in Appearance.

3. Adjustment to Interviewers, the heaviest loading in Factor II above, was deleted as a trait but accepted as an ineradicable feature of an interview and therefore admitted as part justification for the changed form in which the traits were stated, as explained below.

4. The heterogeneous composition of Factor II suggested further investigation into the nature of this factor, and additional traits which might bear upon all round teaching suitability were added. These were selected from the numerous

adjectives descriptive of the teacher's personality which a survey of the literature yielded. The selection was made after considerable discussion and correspondence both within the department and among educationists outside. The need for a thorough going job and trait analysis was appreciated but would have entailed a separate and extensive research.

5. The traits concerned with scholastic and athletic achievement were deleted completely. Factor IV found in the analysis discussed in Chapter IV Section C showed that this was the only part of the interview which overlapped the Head Teacher's report at all extensively and it was agreed that this was a section for which Head Teachers had most evidence available.

Method of Stating and Rating Traits. As indicated in 3. above, following on the findings in Chapter IV Section D, the fact that the interpersonal relationships and adjustments made in an interview affect the marks given as much as the existence of any qualities in the candidates, was used as partial justification for recasting the form of stating and rating the traits.

The distributions, Fig. 4.1 and Fig. 4.2 for the original interview form had also shown a tendency towards leniency, inadequate spread and erratic use of the five grades A to E.

In the modified schedule each trait was given in the form of a statement about the candidate with which the interviewer was asked to agree or disagree with different degrees of emphasis. Thus in place of, say,

General Appearance

A B C D E

there appeared

This Candidate is attractive in appearance

Strongly Disagree	Disagree	No Strong Impression	Agree	Strongly Agree

The first type of statement has several implications and consequences in practice:

1. It suggests that candidates fall into groups and can be categorised.

2. It implies the existence of an objective trait, i.e. that the trait is something which is an attribute of the candidate, not only measurable by the interviewer but remaining constant and unaffected by him when doing so. The careful and

conscientious interviewer, therefore, in his attempts to be fair, ranges over the various grades like a pendulum bob over its rest position, and is pulled in so many directions by the different pieces of evidence as well as by the consciousness of his own limitations and personal predilections, that he finally rates his candidate not so very differently from all the others. This results in a narrow range of marks.

3. The five points A B C D E suggest rating from a zero, A or E, instead of rating about a mean. One has only to listen to the interminable arguments as to whether C+ or B-, for example, shall be considered the 'average mark' to see that this is so, and to realise that the five point scale, simple though it may seem, has statistical implications of mean and scatter which are too complex for many interviewers to follow.

The second form, that of making a statement about the candidate, was an attempt to overcome these difficulties. What the interviewers were required to do was to indicate the extent to which they agreed or disagreed with each statement. The constricting effects of 'objectivity' would,

it was hoped, be removed, for the format implied from the beginning that each rating was a purely personal judgment for which there might or might not be a good reason. The need to rationalise one's judgments, a potent cause of a narrow range of marks, was therefore removed. So that candidates might not, however, suffer from any particularly violent prejudice on the part of an interviewer, each interviewer separately and independently completed his own interview form.

The new interview schedule used a graphic rating scale so that each trait might be considered as a continuous variable, and the wording, 'Strongly Disagree', 'Disagree', etc. chosen so that the midpoint of the scale was the natural datum line rather than either end.

Traits requiring to be rated. The traits finally listed on the schedule were

This candidate (1) makes a good first impression
(2) is attractive in appearance
(3) has a pleasant voice
(4) is cheerful and friendly
(5) shows a sense of humour
(6) is mature

(7) is sensitive

(8) is sincere

(9) is skilled in verbal expression

(10) is intellectually alert

(11) is enthusiastic about teaching

(12) shows a good range and/or depth of interests

(13) has submitted a reliable and accurate statement of interests

(14) seems a suitable person to care for children

The final joint rating was

The panel jointly rates this candidate's suitability for teaching as

---

Poor Fair Good Very Good Exceptional[1]

Each trait was defined where necessary, particularly in the case of such a trait as No. 7 : Sensitivity. Three of the traits call for particular comment.

No.1. Good first impression, was inserted to be rated at the earliest opportunity and before looking at the Head Teacher's report. It was

---

1. This wording was that recommended by Vernon (2.40). In practice every interviewer objected to it as being too generously worded - contrary to the suggestion in Vernon - and later the wording was omitted.

included in an attempt to determine whether halo was conditioned by it.

No. 13. Reliable statement of interests, was inserted as an attempt to estimate the candidate's intellectual honesty. In practice it caused so much argument and irritation among interviewers that it was never included in any subsequent analysis.

No. 14. Suitable person to care for children, was included in an attempt to bring home to interviewers one of the essential desiderata in teachers. It was also hoped that it would show indirectly what the interviewers felt individually about the candidate's suitability for teaching. To avoid any feeling that interviewers were on trial as individuals an individual rating for teaching suitability had not been requested. This omission was subsequently regretted and from the point of view of the research undertaken later and described in Chapter VI Section C it was a definite handicap.

CHAPTER VI

DESCRIPTION, ANALYSIS AND PRELIMINARY DISCUSSION OF EXPERIMENTAL WORK. STAGE 2

SECTION A. ANALYSIS OF EXTENDED SELECTION PROCEDURE

I

PURPOSE OF EXPERIMENT

The purpose of the experiment was two-fold:

1. To determine the groupings of certain data which had been secured for a number of applicants for teacher training.

2. To determine the relationship between this data and interviewers' opinions of teaching suitability.

II

DESIGN OF EXPERIMENT

The sample. The sample consisted of applicants for admission to the University of Birmingham Education Department in 1950, who, in the same way as described in Chapter IV Section A had given Birmingham as 1st or 2nd choice. All applicants

were included in the sample except a few living at extreme distances. The total sample amounted to 375 candidates (224 men and 151 women).

The Procedure. The procedure was that described in Chapter V.

III

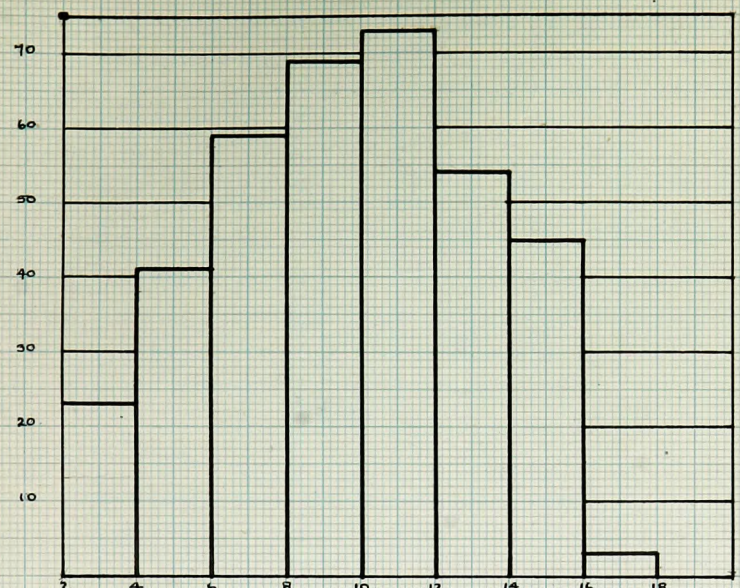
STATEMENT AND ANALYSIS OF RESULTS

The distribution of scores for the following battery are shown in Fig. 6.1

1. Interview final mark
2. Head Teacher's final rating
3. School Certificate
4. Group Test 33
5. Group Test 70/23
6. General Information Test
7. Situation Test
8. Discussion Group
9. Age

The final interview mark was measured from the graphic rating scale to the nearest quarter inch and the discussion group mark similarly to the nearest half inch.

School Certificate was crudely scored by crediting one mark for a pass, two for a credit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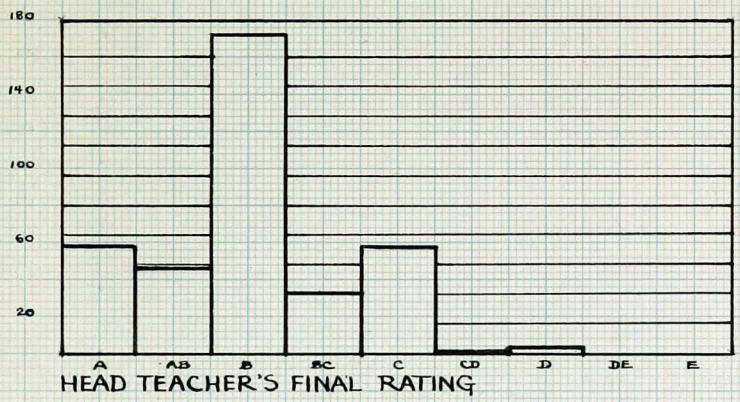
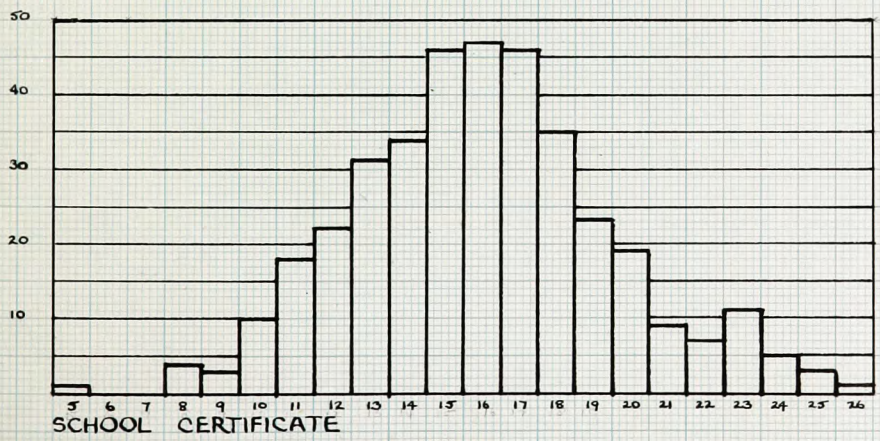
50
40
30
20
10
2
4
6
8
10
12
14
16
18
INTERVIEW FINAL MARK


180
140
100
60
20
A
AB
B
BC
C
CD
D
DE
E
HEAD TEACHER'S FINAL RATING


50
40
30
20
10
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9
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11
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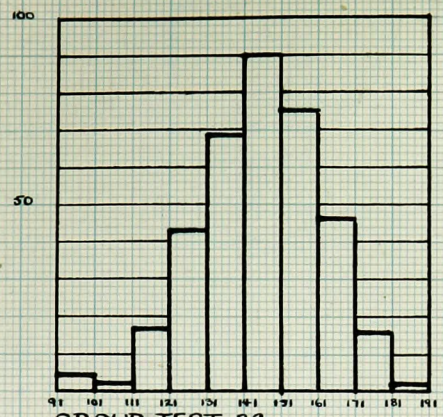
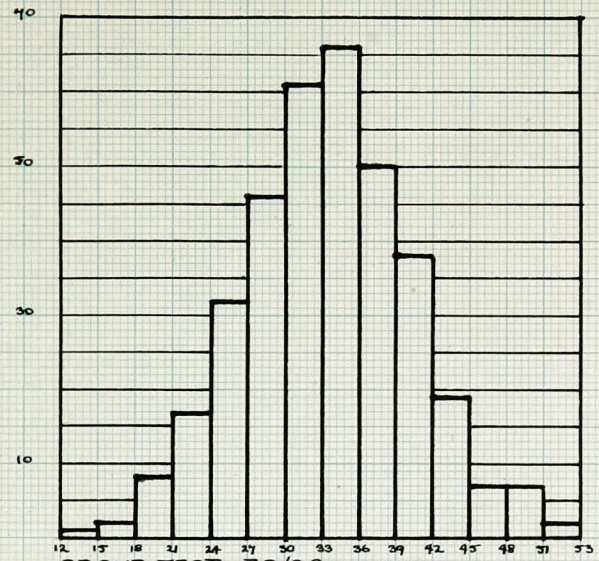
26
SCHOOL CERTIFICATE

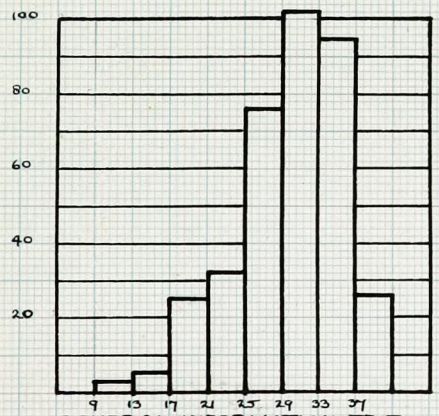
FIGURE 6·1



GROUP TEST 33

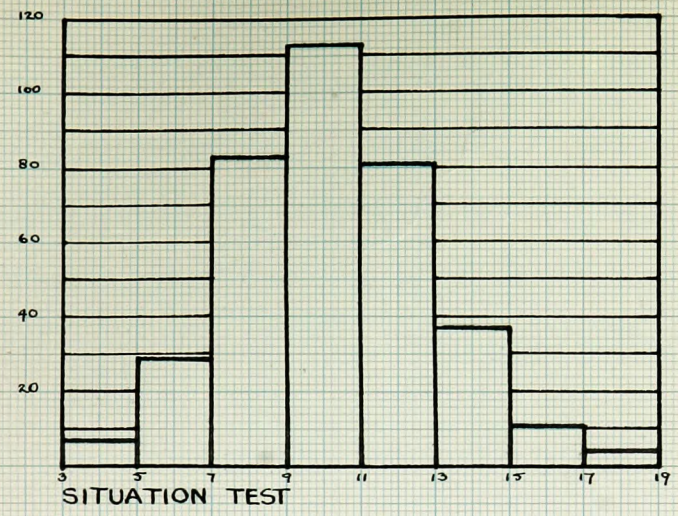


GROUP TEST 70/23



GENERAL INFORMATION TEST

FIGURE 6·1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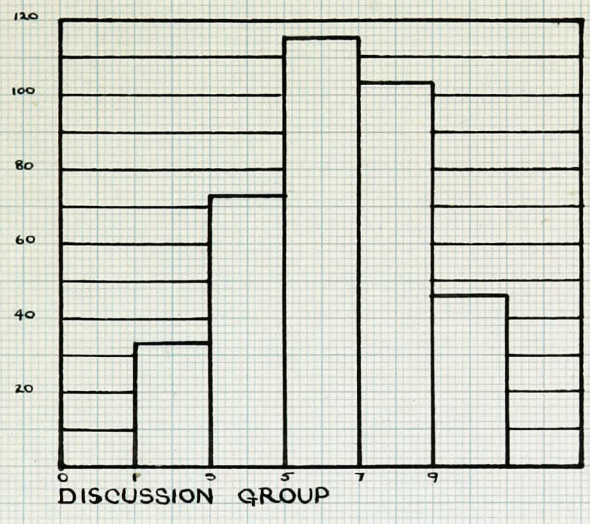
100
80
60
40
20
3
5
7
9
11
13
15
17
19
SITUATION TEST


120
100
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DISCUSSION GROUP

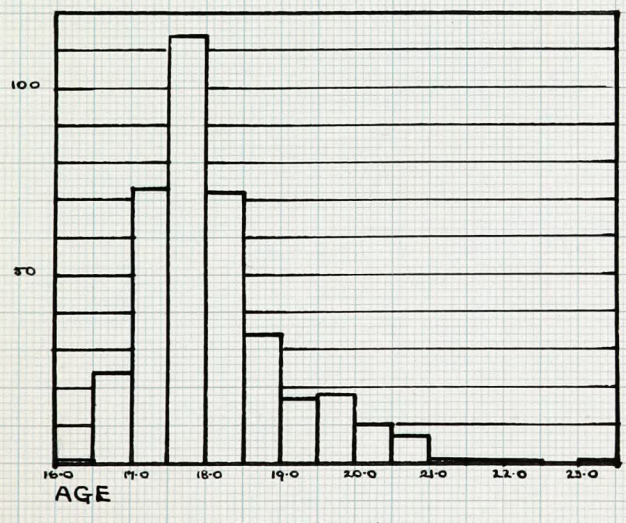

100
80
16·0
17·0
18·0
19·0
20·0
21·0
22·0
23·0
AGE

FIGURE 6·1

and three for a distinction, a procedure which gave a reasonably normal distribution. Age was calculated in months above 16 years. The inter-correlations for the nine tests were calculated, the complete matrix being shown in Appendix VI. A centroid analysis of this matrix was carried to three factors, the centroid loading being given in Table 6.1.

A number of rotations were tried but as it proved impossible to eliminate a bipolar factor Factors I and II were finally rotated orthogonally through 44° and Factor III left unrotated. The rotated factor matrix is given in Table 6.2.

The correlation matrix was rearranged in descending order of correlation with the Interview final mark and a regression equation on this criterion calculated by Aitken's method of pivotal condensation (6.1). After each new test had been brought in, the multiple correlation coefficient was computed. The regression coefficients and the multiple correlation coefficient at each stage are shown in Table 6.3.

It was clear that no further useful information would be derived from carrying the regression

Table 6.1 - Unrotated Centroid Loadings

Test	I	II	III	h^2
1. Interview final mark	418	357	-189	338
2. Head Teacher's final rating	354	236	-356	308
3. School Certificate	154	-212	-330	178
4. Group Test 33	546	-324	168	431
5. Group Test 70/23	349	-272	062	200
6. General Information Test	422	-224	130	245
7. Situation Test	486	-189	096	281
8. Discussion Group	355	484	115	374
9. Age	159	160	430	236
Contribution to Total Variance	14.54%	8.36%	5.86%	
Total Variance extracted	28.76%			

Table 6.2 - Orthogonal Structure.

Test	I	II	III	h^2
1. Interview final mark	053	547	-189	338
2. Head Teacher's final rating	091	416	-356	308
3. School Certificate	.258	-046	-330	178
4. Group Test 33	618	146	168	431
5. Group Test 70/23	440	047	062	200
6. General Information Test	459	132	130	245
7. Situation Test	481	202	096	281
8. Discussion Group	-081	595	115	374
9. Age	003	226	430	236
Contribution to Total Variance	12.24%	10.68%	5.86%	
Total Variance extracted	28.78%			

Table 6.3 - Regression and Multiple Correlation Coefficients

Tests included.	Regression coefficients	Multiple +
2.	314	314
2.8.	273,261	406
2.8.7.	271,244,145	431
2.8.7.4.	268,244,139,021	431
2.8.7.4.6.	267,247,134,034,-038	431
2.8.7.4.6.3.	268,247,135,034,-037,-007	431

equation further.

IV

DISCUSSION OF RESULTS

The correlation matrix shows uniformly low correlations and this, together with the fact that only 29% of the total variance was extracted in the factor analysis, indicates the heterogeneity of the battery.

Factor I has heaviest loadings in

4. Group Test 33	618
7. Situation Test	481
6. General Information Test	459
5. Group Test 70/23	440

This is restricted entirely to written test performance. Having regard to the relative loadings of the two intelligence tests this factor can probably be largely identified with verbal intelligence.

Factor II has significant loadings in

8. Discussion Group Assessment	595
1. Interview final mark	547
2. Head Teacher's final rating	416

The existence of heavy loadings for Discussion Group and Interview might suggest something of a verbal nature. The previous study of the Head Teachers' reports have not, however, shown verbal ability to be any great determinant of their final rating and it seems more likely that some personal quality such as leadership, dominance or what is often loosely called 'personality' is unifying the elements of this factor.

The remaining factor III has been left in bipolar form and contrasts

9. Age 430 with 2. Head Teacher's final rating -356
3. School Certificate -330

Although this factor is not a large one the suggestions are interesting. It suggests that the Head Teacher's final rating is in some degree dependent on School Certificate performance and upon the candidate's youthfulness. Thus the report is more favourable to the younger scholar than to the older one. Within the narrow age range of normal university entrance it has already been noted (1.1 p.105) that the older candidates tend to be less successful than

the younger. Head Teachers, too are known to regard their young prodigies with favour.[1]

All that can be said in the present instance is that this analysis seems to verify the existence of some age differentiation and the tendency should be noted.

In the regression analysis it was possible, by rearranging the correlation matrix in descending order of correlation with the final interview mark, to determine not only the relative weightings of each test which would give the best estimate of this mark, but also the extent to which the tests gave information additional to that obtained from the interview.

The results show that there was extremely little overlap of the tests with the interview. Only three tests gave information already obtainable from the interview, namely, Head Teacher's report, Discussion Group and Situation Test, and even here the multiple correlation .431 is low enough to warrant their being retained as sources of independent evidence. The position is, therefore, that if any of these tests are useful determi-

---

1. Note, for example, the outcry against the minimum age limit of 16 associated with the new General Education Certificate.

nants of ultimate success they should be included at the selection stage since the information they provide is not, to any great degree, obtained at the interview.

V

SUMMARY

Tests, Interview and School performances of 375 applicants for admission to the University of Birmingham Education Department in 1950 were analysed. The Factor analysis showed three main factors:

I. Test performance, probably Intelligence.

II. Personality in the non-technical sense of the word.

III. A bipolar factor contrasting

Age with Head Teacher's report and School Certificate result.

A regression analysis showed that all the tests gave information not provided to any great extent by the interview.

SECTION B. SECOND ANALYSIS OF INTERVIEW PERFORMANCES

I

PURPOSE OF EXPERIMENT

The purpose of the experiment was to determine how interviewers grouped certain traits when using the modified interview schedule described in Chapter V.

II

DESIGN OF EXPERIMENT

The sample. 1. Candidates. The sample of candidates was the same as that used in Section A viz. 375 men and women applicants.

2. Interviewers. The interview panels were constituted as before i.e., two representatives of the Education Department and one representative from the academic department in which the candidate intended to graduate.

Procedure. The procedure was that described in Chapter V.

III

ANALYSIS AND STATEMENT OF RESULTS

The graphic rating scales were scored by measuring to the nearest half-inch, except in the case of rating 15 which was measured to the nearest quarter-inch. The average of the three interviewers' ratings was taken as the candidate's final score for each trait and the distributions of these are shown in Fig. 6.2.

The intercorrelations for the fourteen[1] traits were calculated, the complete matrix of correlations being given in Appendix VII, and a centroid analysis carried to three factors. The centroid loadings are given in Table 6.4.

Oblique rotation of axes to positions approximating to simple structure was effected by the method of extended vectors (See Appendix VII) and post-multiplication of the centroid matrix F by the rotating matrix Λ where

$$\Lambda = \begin{vmatrix} 297 & 239 & 426 \\ 911 & -264 & -329 \\ 288 & -934 & 842 \end{vmatrix}$$

gave projections on the reference vectors as shown in Table 6.5.

---

1. It will be remembered that trait 13 was discarded.

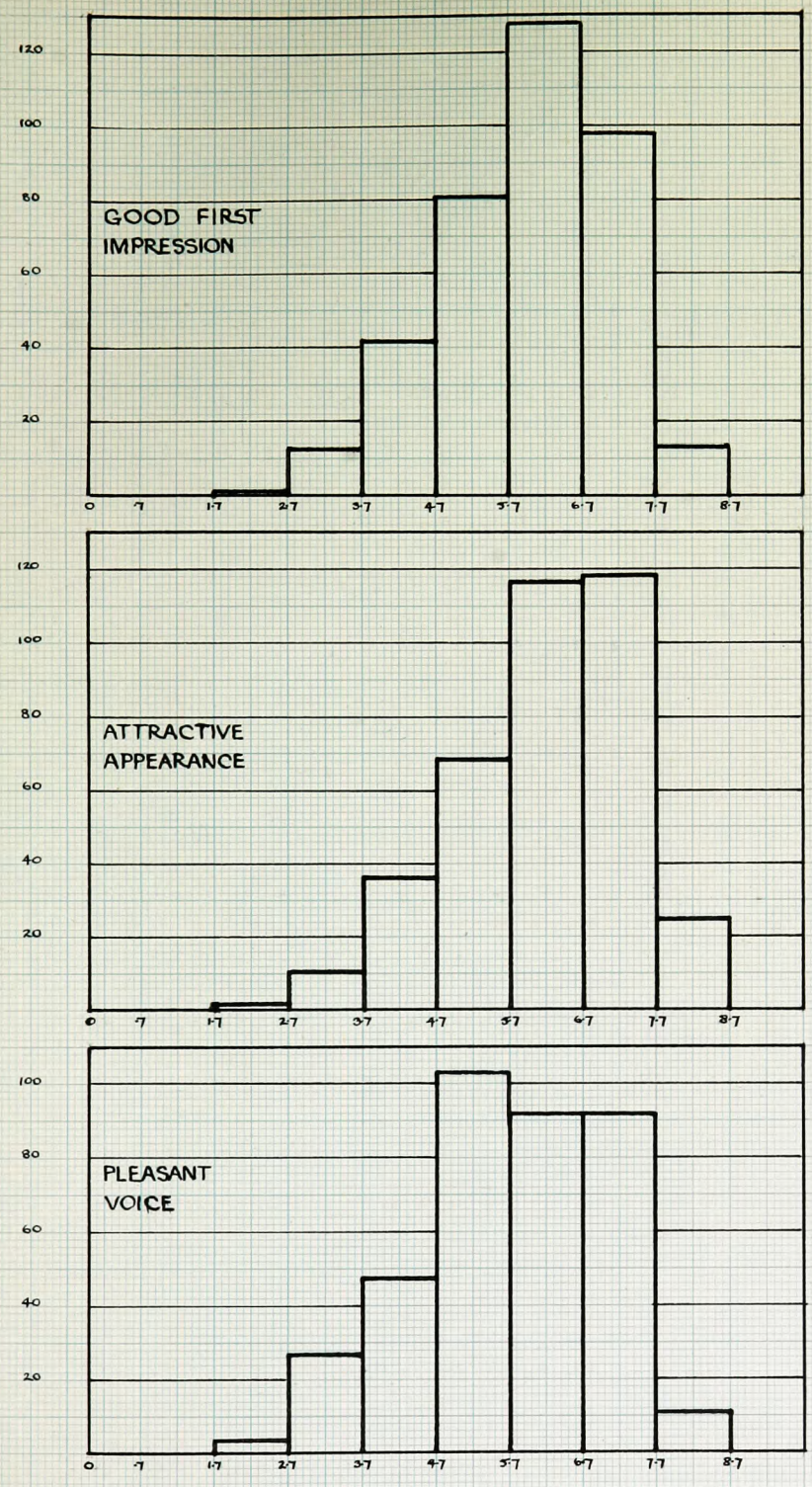

120
100
80
60
40
20
GOOD FIRST
IMPRESSION
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7
120
100
80
60
40
20
ATTRACTIVE
APPEARANCE
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7
100
80
60
40
20
PLEASANT
VOICE
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7

FIGURE 6·2

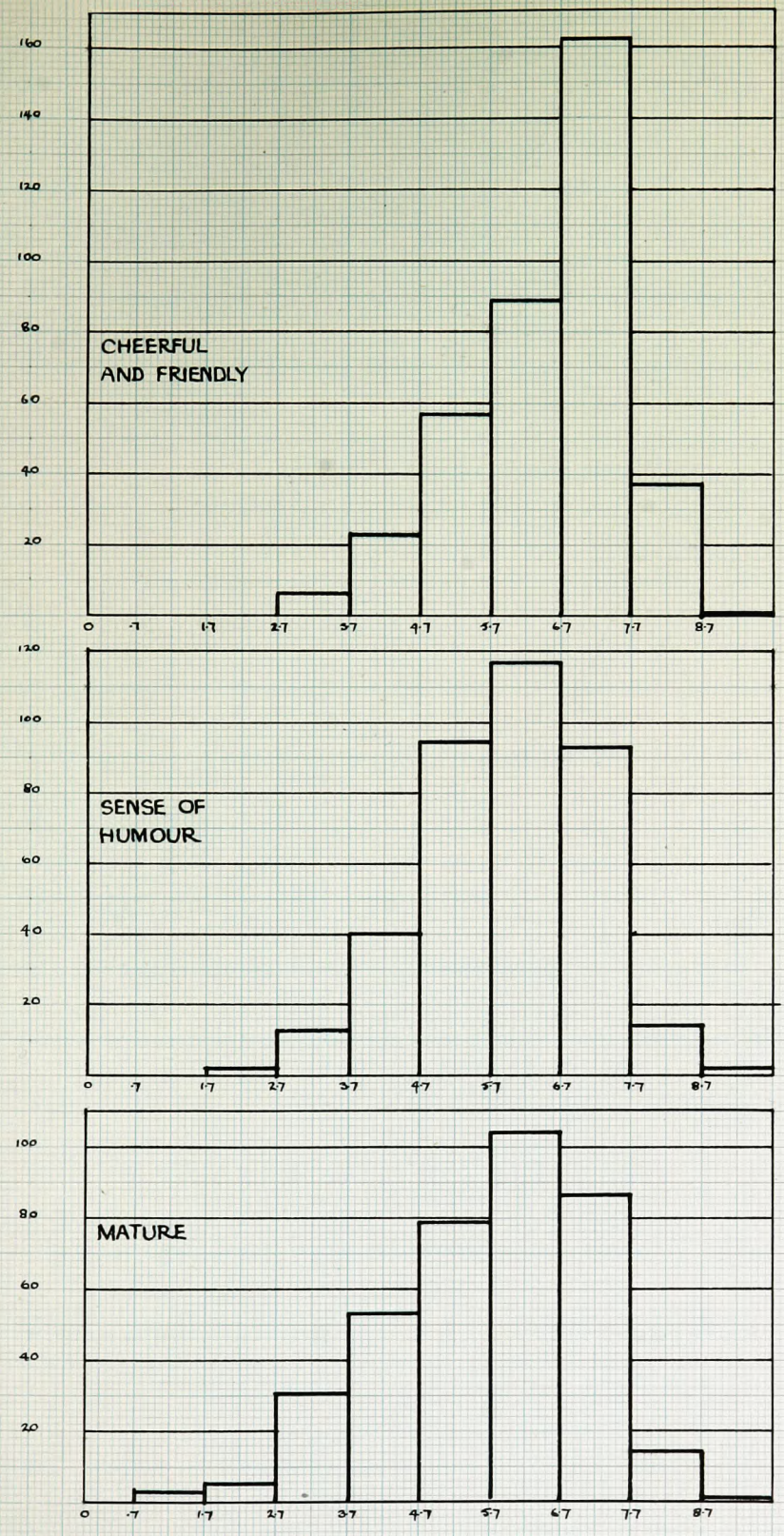
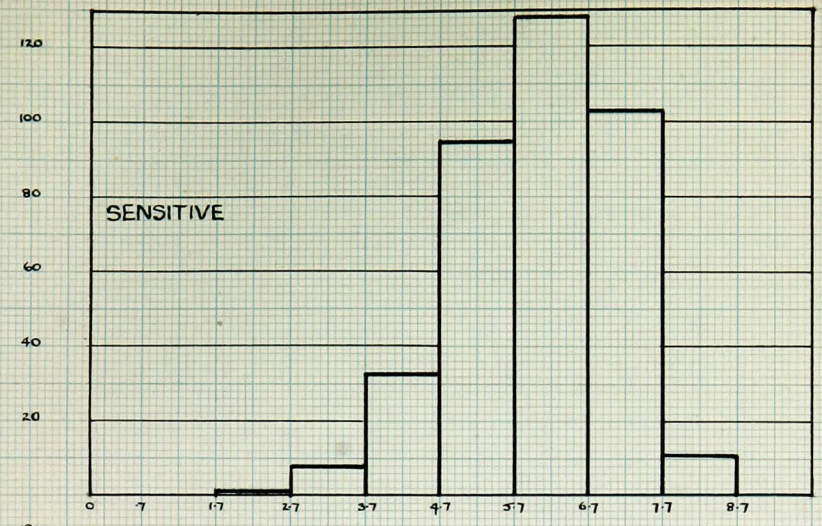
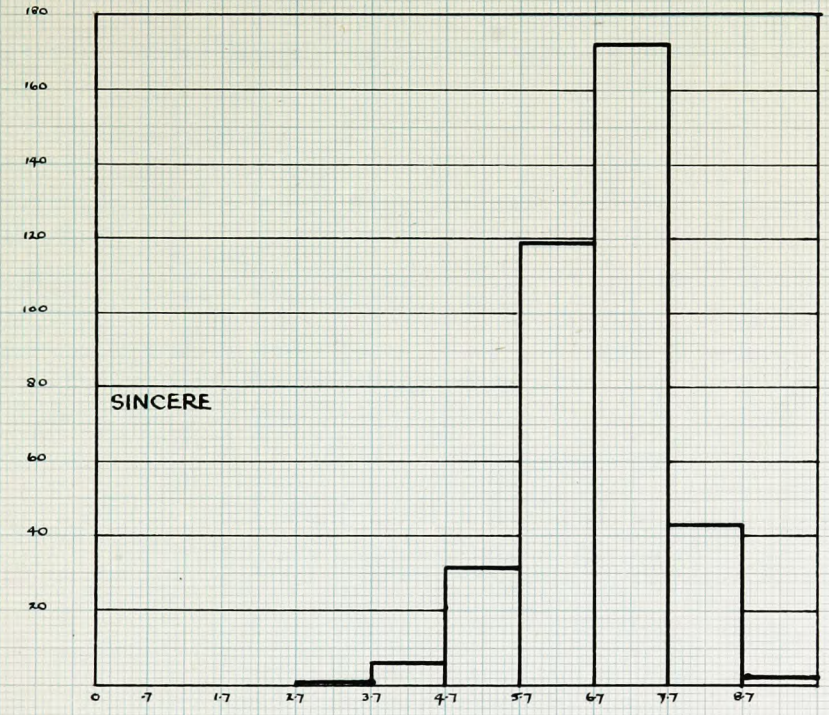

160
140
120
100
80
CHEERFUL
AND FRIENDLY
60
40
20
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7
120
100
80
SENSE OF
HUMOUR
60
40
20
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7
100
80
MATURE
60
40
20
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7

FIGURE 6·2


120
100
80
SENSITIVE
60
40
20
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7


180
160
140
120
100
80
SINCERE
60
40
20
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7

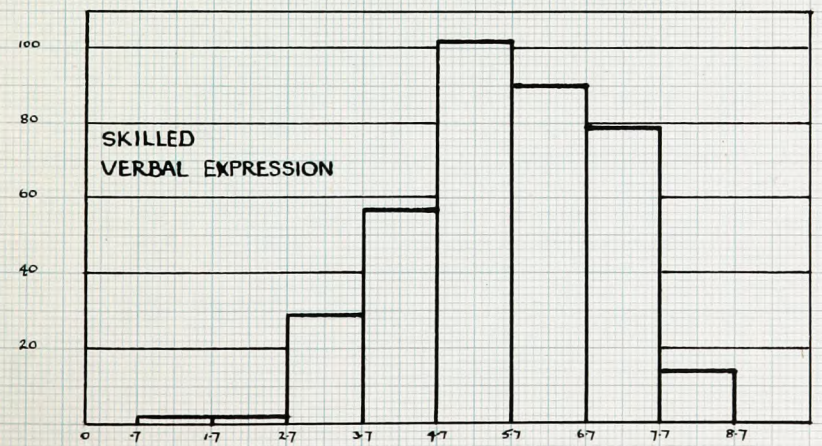

100
80
SKILLED
VERBAL EXPRESSION
60
40
20
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7

FIGURE 6-2

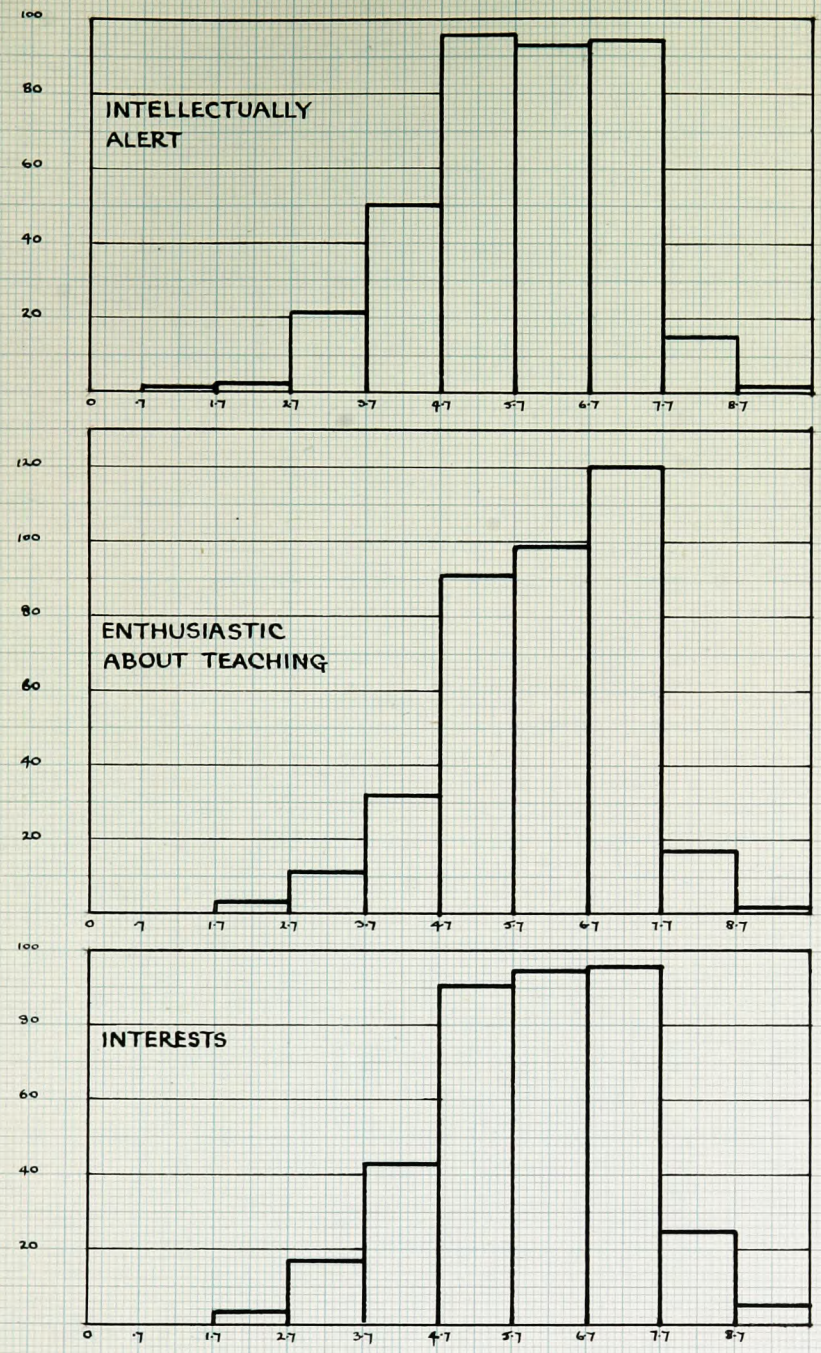

INTELLECTUALLY ALERT
100
80
60
40
20
0
·7
1·7
2·7
3·7
4·7
5·7
6·7
7·7
8·7
ENTHUSIASTIC ABOUT TEACHING
120
100
80
60
40
20
INTERESTS
100
80
60
40
20

FIGURE 6·2

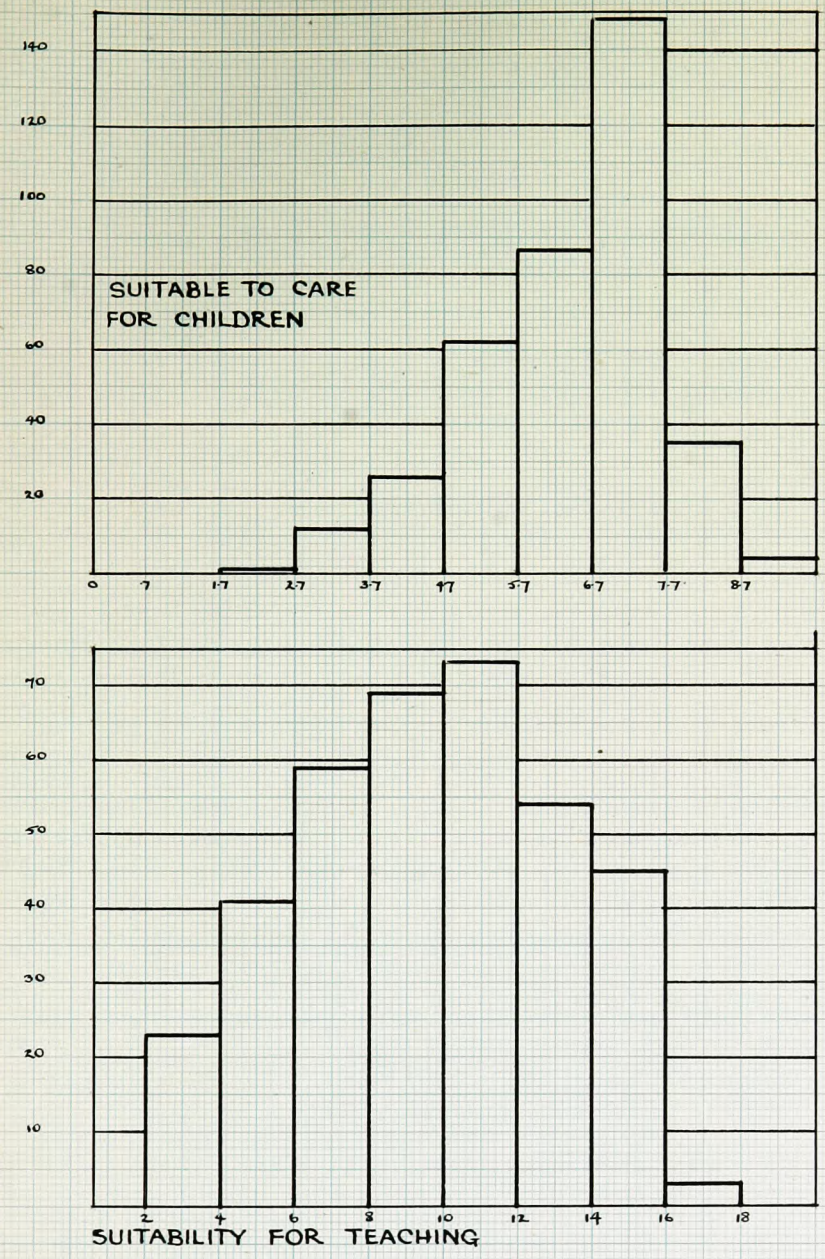

140
120
100
80
60
40
20
SUITABLE TO CARE
FOR CHILDREN
0 ·7 1·7 2·7 3·7 4·7 5·7 6·7 7·7 8·7
70
60
50
40
30
20
10
2 4 6 8 10 12 14 16 18
SUITABILITY FOR TEACHING

FIGURE 6·2

Table 6.4 - Unrotated centroid loadings (F)

Trait	I	II	III	h^2
1. Good first impression	722	548	-263	891
2. Attractive appearance	582	621	-023	725
3. Pleasant voice	678	191	-159	521
4. Cheerful and friendly	770	089	298	690
5. Sense of humour	722	-101	159	557
6. Mature	928	-229	-159	939
7. Sensitive	765	018	190	622
8. Sincere	594	-315	194	490
9. Skilled in verbal expression	762	-157	-376	747
10. Intellectually alert	808	-234	-238	764
11. Enthusiastic about teaching	759	-216	177	662
12. Interests	699	-115	-269	574
14. Suitable to care for children	872	-044	281	841
15. Suitability for Teaching	880	040	141	796
Contribution to Total Variance	57.61%	7.39%	5.06%	
Total Variance extracted	70.06%			

Table 6.5 - Structure on Reference Vectors ($V = F.\Lambda$)

Traits	I	II	III
1. Good first impression	-094	638	274
2. Attractive appearance	024	732	-003
3. Pleasant voice	092	330	260
4. Cheerful and friendly	550	380	-118
5. Sense of humour	475	168	051
6. Mature	337	021	431
7. Sensitive	480	298	001
8. Sincere	520	-055	044
9. Skilled verbal expression	060	-025	575
10. Intellectually alert	221	-042	477
11. Enthusiastic about teaching	543	080	073
12. Interests	109	025	449
14. Suitable to care for children	623	300	-042
15. Suitability for Teaching	480	338	068
Direct contribution to Total Variance	15.27%	10.93%	7.99%
Total direct contribution	34.19%		

Pre-multiplication of the rotating matrix Λ by its transpose gave cosines of angles between the reference vectors

$$C = \Lambda' . \Lambda$$

$$= \begin{vmatrix} 1 & -439 & 069 \\ -439 & 1 & -598 \\ 069 & -598 & 1 \end{vmatrix}$$

corresponding to angles

$$\begin{vmatrix} . & 116^{\circ} & 86^{\circ} \\ 116^{\circ} & . & 53^{\circ} \\ 86^{\circ} & 53^{\circ} & . \end{vmatrix}$$

IV

DISCUSSION OF RESULTS

A study of the histograms in Fig. 6.2 shows the same tendency towards leniency previously noted in Chapter IV Section A, though perhaps somewhat less markedly. Scores range from approximately 1.0 to 9.0. In view of the fact that each score is a mean of three other marks and that the standard deviation is naturally reduced by such a procedure, this range can be taken to indicate that the interviewers made good use of the whole scale.

The oblique factor structure given in Table 6.5 shows that two of the three factors have loadings in Suitability for Teaching though the loading in Factor II is rather small.

Considering first this factor, II, heaviest loadings are found in

2. Attractive appearance	732
1. Good first impression	638
4. Cheerful and friendly	380

and there are a number of smaller loadings of the order of .3, which include

3. Pleasant voice	330
15. Suitability for Teaching	338
14. Suitable to care for children	300

There is a certain parallel here with the factor tentatively identified in Chapter IV Section A as Externals of Personality or Culture, for easily the heaviest loadings are associated with superficialities and trappings. The first two loadings are, however, so much greater than the others that this factor seems somewhat more limited than the earlier one. It is concerned principally with the candidate's appearance and indicates that

interviewers are affected by this.

Factor III has no loadings in either of the teaching or child care suitability ratings. Its heaviest loadings are

9. Skilled in verbal expression	575
10. Intellectually alert	477
12. Depth and/or range of interests	449
6. Maturity	431

a set of traits descriptive of the mature, cultured mind. The absence of any loadings for the teaching suitability ratings suggests that this is not primarily the type of person the interviewers are looking for or, possibly, that they regard such a person with some suspicion. It would seem, by comparing this factor with factor I below, that interviewers are more concerned with those qualities of patience and kindliness which the teaching of young children, particularly, demands than with the qualities of factor III which are more typical of the best type of Sixth Form teacher.

Factor I, which accounts for the greatest percentage of the total variance, has its heaviest

loadings in

13.	Suitable to care for children	623
4.	Cheerful and pleasant	550
11.	Enthusiastic about teaching	543
8.	Sincere	520
14.	Suitable for teaching	480
7.	Sensitive	480
5.	Shows sense of humour	475

This is not only the largest factor, it is also the one which shows easily the heaviest loadings in Suitability to care for Children and Suitability for Teaching. It can probably be identified as 'All-round Teaching Suitability' as judged in the interview and indicates the features considered most essential by the interviewers. It will be observed that none of these were cognitive.

Although a fuller comparison of these factors with those found in Chapter IV Section A will be made later, it can be noted at this stage that the original Teaching Suitability factor seems here to have split into two components, the present factors I and III, one mainly affective and the other cognitive. In judging suitability for teaching the interviewers seem to have considered

the former the more important.

V

SUMMARY

The interview performances of 375 applicants for admission to the University of Birmingham Education Department in 1950 were analysed and three factors obtained:

I. General Teaching Suitability

II. Externals of Personality or Culture

III. Maturity and Scholarship.

The variables associated with factor I were entirely non-cognitive and included such things as sincerity, sensitivity, cheerfulness, humour etc.

SECTION C. A COMPARISON OF THE PERFORMANCES OF INTERVIEWERS WORKING WITH AND WITHOUT INTERVIEW SCHEDULES

I

PURPOSE OF EXPERIMENT

The purpose of the experiment was to compare the performances of interviewers, both individually and as panels when working with and without schedules of the type described in Section A of this Chapter.

II

DESIGN OF EXPERIMENT

Interviewers. The interviewers were members of the staff of a newly created two-year Training College, where, by virtue of its newness, no particular tradition of interviewing had been created. This was felt to be a point of some importance. It would have been quite unrealistic, for example, to have expected part of the staff of the University of Birmingham Education Department to switch to non-schedule interviewing after several years'

experience with interview schedules.

The interviewers were grouped into two exclusive blocks of seven, those who were to work with schedules and those who were to work without them.

The Candidates. The candidates were applicants - all women - for admission to the Training College in October 1950. In all 111 candidates were interviewed in the present experiment.

Procedure. Candidates were called forward in randomly constructed groups of from eight to ten. The first group called forward was allocated to the non-schedule interview block, the second group to the schedule interview block and so on. The non-schedule block thus interviewed 56 applicants in six groups and the schedule block 55 in six groups. Owing to the newness of the procedure for the interviewers in both blocks it was decided that the first group in each case would be used as a trial group.

From each interview block two panels of three were formed for each interview day, and each candidate was seen independently by each

panel within a block for from twenty to thirty minutes. Each candidate, therefore, had two interviews at the hands of either two schedule panels or two non-schedule panels. It should be emphasised that they did not have one interview of each type but only two interviews of the same type. The design is shown in Fig.6.3.

The interviewers working without schedules were required only to record

1. their individual ratings of the candidate's Suitability for Teaching;

2. their joint rating under the same heading.

Each of these was done on a five inch graphic rating scale.

The interviewers working with schedules used the schedule described in Section A of this Chapter.

III

ANALYSIS AND STATMENT OF RESULTS

Two main comparisons were considered

1. Between schedule and non-schedule panels.

2. Between individuals within panels and the panels as a whole.

Fig. 6.3 Design of Interview Experiment

	Schedule Block			Non-Schedule Block	
	Panel 1	Panel 2		Panel A	Panel B
Day 1	Cand. 1 2 3 ⋮ n	1 2 3 ⋮ n	Day A	Cand. a b c ⋮ p	a b c ⋮ p
	Panel 3	Panel 4		Panel C	Panel D
Day 2	Cand. n+1 n+2 n+3 ⋮ 2n	n+1 n+2 n+3 ⋮ 2n	Day B	Cand. p+a p+b p+c ⋮ 2p	p+a p+b p+c ⋮ 2p
	Panel 5	Panel 6		Panel E	Panel F
Day 3	Cand. 2n+1 2n+2 ⋮ etc.	2n+1 2n+2 ⋮	Day C	Cand. 2p+a 2p+b ⋮ etc.	2p+a 2p+b ⋮

1. COMPARISON BETWEEN SCHEDULE AND NON-SCHEDULE PANELS

a. Comparison of Correlations

The graphic rating scales were converted to scores from a total of 20. The product - moment correlations between the final joint ratings of each panel operating within each day were calculated. These are given in Table 6.6.

Table 6.6 - Correlations within two types of interview procedure

Schedule			Non-Schedule		
	r	N		r	N
Day 1	.43	10	Day A	.09	10
2	.55	9	B	.56	10
3	.88	9	C	.15	10
4	.43	9	D	.11	8
5	.57	8	E	.30	10
Mean weighted r (via Fisher's z)	.60			.26	

Difference of z's = .43

$\sigma_{diff.z}$ = .31 p = .17

b. Comparison of Standard Deviations

The standard deviations for each panel are shown in Table 6.7.

Table 6.7 - Standard Deviations for Schedule and Non-Schedule Panels

Schedule			Non-Schedule		
	σ	N		σ	N
Panel 1	5.05	10	Panel A	3.60	10
2	4.91	10	B	4.03	10
3	3.89	9	C	3.52	10
4	4.28	9	D	3.74	10
5	4.40	9	E	4.07	10
6	4.57	9	F	3.15	10
7	4.54	9	G	4.29	8
8	5.00	9	H	4.12	8
9	5.58	8	I	3.97	10
10	5.21	8	J	3.80	10
Mean $\sigma_{R.M.S.}$	4.77			3.84	

Difference of σ's = .93

$\sigma_{diff.\sigma}$ = .64 p = .15

2. COMPARISON BETWEEN INDIVIDUAL OPINIONS AND PANEL OPINIONS

a. Comparison of correlations

In the case of the non-schedule panels each interviewer was asked to give an individual rating before the discussion which led to the panel's joint rating. Thus for each candidate eight scores were available:

From individuals in Panel A	3
From Panel A jointly	1
From individuals in Panel B	3
From Panel B jointly	1

For each pair of panels it was therefore possible to calculate

1. Inter-class correlation between Panel A and Panel B joint scores

2. Intra-class correlation among three individual scores from Panel A

3. Intra-class correlation among three individual scores from Panel B.

The inter-class correlations are those previously shown in Table 6.6. The intra-class correlation for each panel was calculated by analysing the variance of the 3n scores (where

n is the number of candidates) given by the three interviewers, into two components.

Variance between candidates (V_b) with n-1 degrees of freedom

Variance within candidates (V_w) with 2n degrees of freedom

$$\text{Then } r_{intra} = \frac{V_b - V_w}{V_b + 2 \times V_w} \qquad (6.2)$$

there being 2 d.f. between interviewers

The inter-class correlations and their correponding intra-class correlations are given in Table 6.8.

Table 6.8 - Agreement between and within non-schedule panels

		Inter-class r	Intra-class r
Day	A	.09	.65 .91
	B	.56	.44 .79
	C	.15	.30 .26
	D	.11	.74 .25
	E	.30	.66 .35

b. Analysis of Variance for individual interviewers within each type of panel

As stated earlier (Chapter V), interviewers working with schedules had not been asked to give individual ratings for suitability for teaching

before giving their joint ratings. Thus a comparison of the type made in the previous paragraph was not possible in their case. Ignoring the joint ratings completely, however, it was possible to make some sort of comparison by analysing the variance among the individual ratings for Suitability for Teaching on the non-schedule panels, and analysing, similarly, the individual ratings of the schedule interviewers for 'Suitable to care for children.'

In order that the sums of squares for individual panels might ultimately be added, i.e., that the experiment might be considered as replications of a single experiment, it was first necessary to make the number of candidates seen by each panel the same. Each group of candidates was therefore reduced to eight by dropping cases at random through the use of tables of random numbers (6.3).

Each experiment was then of the form:

	Interviewers					
	Panel 1			Panel 2		
Interviewer	A	B	C	D	E	F
Candidate 1						
2						
3						
⋮						
8						

There were five such experiments for each type of interview procedure. In each experiment the sums of squares can be partitioned:

Between Interviewers	5d.f.	
Between Panels		1d.f.
Between Interviewers within Panels		4d.f.
Between Candidates	7d.f.	
Interaction	35d.f.	
Total	47d.f.	

Hence by adding sums of squares and degrees of freedom each type of interview procedure breaks down into

Between Interviewers	25d.f.	
Between Panels		5d.f.
Between Interviewers within Panels		20d.f.
Between Candidates	35d.f.	
Interaction	175d.f.	
Total	235d.f.	

Analysis in this manner gave figures shown in Tables 6.9 and 6.10.

IV

DISCUSSION

It must be emphasised from the beginning that any discussion on the present section must be

Table 6.9 - Analysis of Variance for Schedule Panels

	Sum of Squares	d.f.	Mean Square	F(against Interaction)
Bet. Ints.	465.66	25	18.63	
Bet.Panels	309.66	5	61.93	16.43
Bet. Ints. within Panels	156.00	20	7.80	2.07
Bet. Cands.	628.22	35	17.85	4.76
Interaction	660.02	175	3.77	
Total	1753.90	235		

All entries in final column significant at 1% level

F for Bet. Panels /within Panels = 7.94 1%

F for Bet. Panels/ Bet. Cands = 3.45 5%

Table 6.10 - Analysis of Variance for Non-Schedule Panels

	Sum of Squares	d.f.	Mean Square	F(against Interaction)
Bet. Ints.	248.64	25	9.95	
Bet. Panels	187.97	5	37.59	16.13*
Bet. Ints within Panels	60.67	20	3.03	1.30
Bet Cands.	409.47	35	11.70	5.02
Interaction	407.02	175	2.33	
Total	1065.13	235		

First and third entry in final column significant at 1% level

Second entry in final column not significant

F for Bet. Panels/Within Panels = 12.41 1%

F for Bet. Panels/Bet. Cands. = 3.21 5%

considered speculative for two main reasons.

1. Due to administrative difficulties with which Training Colleges have to contend in securing applicants from and passing rejects on to the central clearing house, the number of cases handled in this experiment was smaller than had been anticipated. Hence results based on correlation analysis were doomed to inconclusiveness.

2. Owing to misjudgment on the part of the investigator schedule panels were not asked to give individual ratings for Suitability for Teaching. Hence a comparison even by means of small sample statistics involved a comparison between two not strictly comparable quantities.

With these limitations in mind it is still possible to observe certain trends. All the correlations between panels working with schedules (Table 6.6) are as high or higher than those between panels working without them. Although mean r's derived from the several samples are not significantly different at the 5% level there are still five chances in six that the differences are indicative of real differences. Only an

extension of the experiment could verify these indications.

Similar remarks apply to a comparison of the standard deviations in Table 6.7., the schedule panels in all cases spreading their marks more than the non-schedule. This is also indicated by a comparison of the total sum of squares in Tables 6.9 and 6.10. In view of the known tendency for interviewers - and for that matter, most examiners - to restrict themselves to too narrow a part of the complete marking scale, this seems to be an entirely desirable result. It may have been that the entire block of seven schedule interviewers had a tendency to spread their marks and a tendency to closer agreement through some virtue of their own rather than through any virtue of the interview schedule. The obvious method of overcoming this objection, namely selection of the different types of panel each day from the whole body of the staff, was felt to be invalid, since practice in both types of interview would have tended to produce a uniformity of method, and eliminate the very differences with which the experiment was concerned.

This same reason, it will be recalled, prevented the experiment being conducted in the University where practice with schedules had been obtained over several years.

The analysis of variance in Tables 6.9 and 6.10 was carried out with scores which were, perhaps, less carefully considered than the final joint ratings. In this case it might well be expected that they would be more scattered. The analysis shows, however, that this scatter, the 'between interviewers within panels' variance, which is the variance between the six interviewers after panel differences have been removed, is small by comparison with the 'between panels' variance. In both cases, whether it be with or without schedules, the variance ratio for 'between panels' to 'between interviewers within panels' is highly significant, although it is to be noted that the level of significance, high as it is, is somewhat lower in the case of schedule panels. The conclusion seems to be that even prior to the discussion there seems to be some measure of agreement or not too great a measure of disagreement between the individuals within each panel, but that there is

considerable disagreement between the two panels. This is also the suggestion made by the figures for inter-class and intra-class correlation for non-schedule panels only, given in Table 6.8. The reasons for this in terms of field theory seem clear, but the further discussion of this will be postponed to Chapter VII.

It remains to observe that whereas the variance between the interviewers within panels is in both cases less than that between the candidates, the variance between the panels is significantly greater that that between the candidates. Put otherwise, a measuring instrument designed to evaluate differences has an error associated with it which is greater than the very differences it is supposed to measure.

The provisional conclusion to be drawn from this experiment, therefore, after taking due note of its limitations, is that whereas independent, individually assigned marks differ very considerably between panels and much less so between the interviewers within each panel, marks which are jointly assigned after discussion within each panel show somewhat closer agreement in the case

of panels working with schedules than they do in the case of panels working without them. This conclusion applies only to the described experimental set-up using interviewers of intelligence, ability and enthusiasm but without previous experience of working in the manner described.

V

SUMMARY

An experiment was carried out in a Training College in which 111 women applicants for admission in 1950 were interviewed by two different panels, each of three members, working with or without interview schedules.

Before the discussion within each panel, which followed the interview, it was found that the members within the panels were largely in agreement, but that there was considerable disagreement between panels.

After the discussion within each panel there was closer agreement between panels using interview schedules than there was between those not using them.

CHAPTER VII

REVIEW AND CONCLUSIONS

The principal conclusions to be derived from the experiments described in Chapters IV and VI have been discussed in their appropriate sections. It is not the purpose of this chapter to repeat these but rather to integrate them and survey the findings as a whole.

I

THE FACTOR ANALYSES

Figure 7.1 shows the factors derived from the five factor analyses described in Chapter IV, Sections A, B and C and Chapter VI, Sections A and B. In this diagram the provisional names have been retained, although these were little more than convenient labels for discussion, and the Roman figures corresponding to those given in the original descriptions are shown. Additionally, the factors have been renumbered from 1 to 17 for reference in this chapter. Arrows linking what appear to be similar factors are shown as full

FIRST INTERVIEW

1.I. Externals of Personality

Dialect
General Appearance
Voice Quality
Physical Bearing

2.II. Teaching Suitability

Adjustment to Interviewers
Suitability for Teaching
Power of Expression
Sense of Vocation
Interests
Personal Adjustment

3.III. School Activities

Physical Activities
School Activities
Physical Bearing

HEAD TEACHER'S REPORT

4.I. School Activities

Sports and Athletics
Adjustment to others
Personal Adjustment
General Social Life

5.II. Leadership aspect of Teaching

Leadership
Suitability for Teaching

6.III. Intellectual aspect of Teaching

Intellectual interests
Personal Adjustment
Suitability for Teaching

EXTENDED ANALYSIS

7.I. Interview Performance

8.II. Performance on Head Teacher's Report

9.III. Test Performance

10.IV. Social Acceptability

Physical Activities
Speech
School Activities
Physical Bearing
General Social Life
Leadership
Sports and Athletics

11.V. Emotional and Physical Balance

Personal Adjustment
Adjustment to Interviewers
Physical Bearing
Physical Activities

SECOND INTERVIEW

12.II. Externals of Personality

Attractive Appearance
Good first Impression
Cheerful and Friendly
Pleasant Voice
Suitable for Teaching
Suitable to care for Children

13.I. Teaching Suitability

Suitable to care for Children
Cheerful and Friendly
Enthusiastic about Teaching
Sincere
Suitable for Teaching
Sensitive
Sense of Humour

14.III. Maturity and Scholarship

Skilled in Verbal Expression
Intellectually Alert
Depth or Range of Interests
Maturity

EXTENDED PROCEDURE

15.I. Test Performance

16.II. 'Personality'

Discussion Group Assessment
Interview final rating
Head Teacher's final rating

17.III.

Age v. Head Teacher's final rating
School Certificate

Fig. 7.1

lines unless the linkage is tentative, when they are broken.

From this diagram it is possible to list what are apparently the main forces operating at the selection stage.

1. Estimates of Teaching Suitability.

From 2, 5, 6 and 13 it appears that the estimate of this ability is based principally on non-cognitive traits such as enthusiasm for the job, cheerfulness and pleasantness, sincerity and sensitivity. These are all traits which do not readily lend themselves to objective measurement and will therefore need careful and repeated estimation. They are probably the traits that contributed most to the estimates of adjustment in factors 2 and 6.

The only trait which appears in this group and is largely cognitive is interests, which shows up in both factors 5 and 6. It is possible that this has only remained in the group for want of a more refined analytical technique. The fact that in the second interview analysis, which resulted from a more comprehensive survey of the candidate, this trait did slough off with factor 14 seems to bear this out.

2. Superficial qualities of personality resulting from local culture.

Factors 1 and 12 both indicate that surface traits of speech, manner and appearance constitute a force operating in the interview. It has been pointed out elsewhere (2.1) that these traits can be highly delusive, and it is therefore doubtful whether they should be given any great weight.

3. Acceptability at School.

Factors 3, 4 and 10 all indicate that social and athletic activity at school operates favourably at the selection stage. The factor is so constituted as to suggest that it is not sufficient that the candidate should have taken part in these activities but, additionally, that he should have a sufficiently well balanced personality to be a good mixer and a good social companion. The whole, while difficult to define, is suggestive of the modest hero, well liked by his fellows and by the staff. This factor is one on which Head Teachers place particular emphasis. There is no suggestion that academic ability plays any part in it.

4. Performance in written tests.

If written tests are a part of the selection procedure, performance in these as a whole creates a separate factor. The evidence provided by such tests is not, it seems, obtained by other means such as the interview or the Head Teacher's report.

The four discriminants given above are those which seem to be most strongly defined by the five factor analyses. Among other determinants less well defined is

5. Maturity and Scholarship

This appears to be a distinct factor which, as observed above, may be a minor determinant of teaching suitability. It may possibly be a product of the particular set-up of the interview previously described, in which one of the three panel members was more concerned with that aspect of the candidate than with his suitability for teaching.

II

THE INTERVIEW EXPERIMENTS

The interview experiments seem to suggest that although the interview has a considerable measure of unreliability this can be reduced, although by no means eliminated, by the use of a schedule. By

its use interviewers who have become experienced with it can make comparable judgments even of a quantitive type.

Contrary to the suggestion made by Hartog and Rhodes (2.37) that discussion among the interviewers did not improve the reliability of the interview, there was evidence to show that, at least in the case of panels using schedules, greater agreement existed between the panels after discussion than before.

III

THE INTERVIEW AS A TOTAL SITUATION

Two facts appear to link the two parts of the work reviewed above.

1. In factor 2 the factor for teaching suitability was dominated by adjustment to interviewers.

2. In the interview experiments of Chapter VI, Section C there was invariably close agreement within panels and very much less agreement between panels seeing the same candidates.

The first of these is the clue to the second.

Whenever a candidate is interviewed by one or more people in a panel a field of force is created which binds interviewers and interviewee into a dynamic whole. This, together with the time and place of the interview, is the total situation described by Lewin (7.1). The interviewers and interviewee are not two separate entities, one a constant, unchanging measuring instrument and the other a specimen submitted for measurement, but are interlocked so that the forces appearing during the interview are characteristic not of any one component individual but of the whole group. Consequently the recorded picture of the candidate will not be characteristic solely of the candidate but of the total group of people, together, as was seen in Chapter IV, Section D, with the time when the group was operating.

It follows, therefore, that the number of people sitting together on a selection panel need not be considered as of first importance, for they will all be largely under the influence of similar forces and see a similar picture of the candidate. What is important is the number of different circumstances under which the candidate can be observed. It has been shown already that, for all practical

purposes, the pieces of evidence secured from different sources, tests, reports and so on are independent and unrelated. The candidate's behaviour, which is the guide to his personality, is largely a product of the situation in which he finds himself and different aspects of it in different situations may similarly appear unrelated. In fairness both to the candidate and to those to whom the products of selection will eventually come, these situations should be as many and varied as possible.

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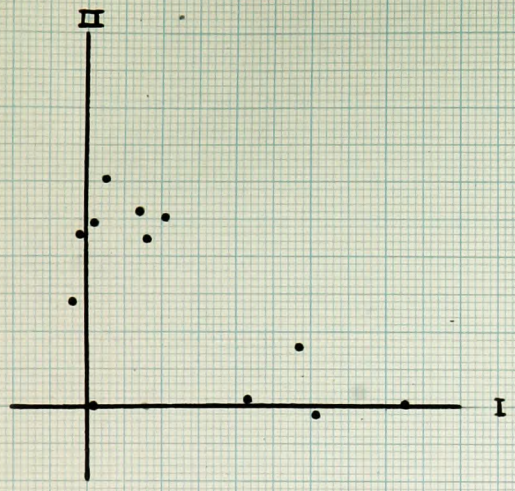
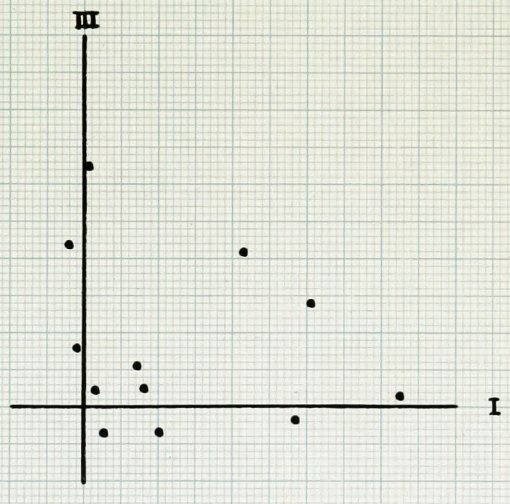
APPENDIX I

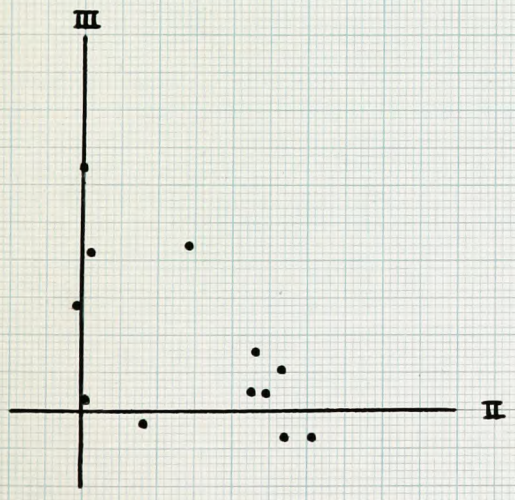
Intercorrelations of twelve interview assessed traits

1											
2	52										
3	35	53									
4	47	48	49								
5(1)	35	30	16	51							
5(2)	42	36	20	53	74						
5(3)	62	44	25	49	58	69					
6(1)	47	41	32	75	62	65	56				
6(2)	53	48	33	55	45	56	61	59			
6(3)	57	45	29	52	43	56	71	55	73		
7	58	48	27	46	38	48	62	47	52	62	
8	68	63	39	67	56	64	74	67	72	74	73
	1	2	3	4	5(1)	5(2)	5(3)	6(1)	6(2)	6(3)	7

Figures in this and all subsequent matrices are given correct to two decimal places although four figures were retained in the calculations. For simplicity all decimal points are omitted.







FINAL LOCATION OF AXES

In a large group one would expect to rate	
1	out of 12 candidates A
1	" " " E
2	" " " B
2	" " " D
6	" " " C+,C,C-.

NAME.....
SCHOOL.....

Age.....
Hall.....
Home.....
Lodgings.....
Course.....
Academic subjects.....
Alternatives.....

Assign grades for each quality by ringing round the appropriate letter on the rating scale. Attempt to achieve normal distribution and avoid "halo". (See hints to Interviewers). Throughout ring any work which seems markedly appropriate to the candidate.

								Comments (if any) Concrete examples are useful.
1.	Interests (other than those in 2 & 3 below) Of wide, keen and well-developed interests in one or more fields (e.g. photography, stamp collecting, bird-watching, meteorology etc). mechanical tinkering, acting, music, arts & crafts.	A	B	C	D	E	No interest of significance beyond routine work.	1.
2.	Part played in school activities and the social life of the School. Dominant part in school activities	A	B	C	D	E	Practically no part in School activities.	2.
3.	Physical activities. (e.g. games, swimming, walking, rock climbing, camping, types of dancing. Interested in and likely to continue activities.	A	B	C	D	E	No interest in any physical activity.	3.
4.	Physical bearing. Commanding, vigorous, likely to stand out in any group.	A	B	C	D	E	Insignificant, or having physical characteristics likely to prove a handicap. (State specific defects if any---	4.
5.	Speech							5.
i	Dialect, local accent, or intonation No trace, Enunciation clear	A	B	C	D	E	Strong dialect, local accent or intonation. Blurred speech. (State specific defects if any---	i
ii	Voice Voice of good quality and well pitched	A	B	C	D	E	Voice of very poor quality or badly pitched.	ii
iii	Power of expression Clear, precise and fluent	A	B	C	D	E	Hesitant, muddled and inadequate	iii

6. General Appearance and
i Social attractiveness. A B C D E

ii Personal adjustment
Excellent, confident, amiable, well-balanced, stable A B C D E

iii Adjustment to Interviewers
Makes contact easily. Readily takes part in "give and take". Socially responsive. Sensitive to the situation. A B C D E

7. Sense of Vocation.
Strong well-informed sense of vocation. A B C D E

8. Suitability for Teaching.

A B C+ C C- D E

Accept for place. Reserve Reject.

9. Reasons (if any) other than those already given elsewhere for decision as to suitability-outstanding strong points or outstanding weaknesses-or an impression that apart altogether from or in addition to the qualities noted the candidate would, or would not make a good (or bad) teacher, i.e. an "intuitive" decision.

Disagreeable manners and/or appearance and/or mannerisms

Comments (if any. Concrete examples are useful.
6.i
ii

Poor; very nervous, anxious, irritable

iii

Unresponsive. Very reserved. Needs constant prodding. Unduly aggressive, self-assertive or shy.

Little idea of what teaching entails. Little enthusiasm for job.

7.

8.

Date.....

Signed.....

APPENDIX II

CONFIDENTIAL

This report will not be seen by the student or by any unauthorised person.

NOTES.

The mid-points of the scale below correspond to the average level of all H.S.C. candidates in Grammar Schools (not merely those who propose to teach), and the lowest point to those few who are the worst of each group in the particular trait or quality rated. One would expect on an average that, in successive groups of twelve candidates, six would be in the middle range (C), two each would be rated (B) and (D) and one each (A) and (E). These proportions are a guide merely and will probably not hold precisely for any one group of twelve pupils.

Will you, therefore, express your judgment of the candidate by *ringing round* the letter which best indicates the candidate's standing in the qualities rated. If you are doubtful as to which of two ratings to give, please ring both.

1. **Intellectual Interests** (e.g., in Literature, Art, Music, Scientific Pursuits, etc., outside of, springing from, but not directly part of, the Secondary School curriculum.

   Of wide, keen and well developed interests. A B C D E No interests of cultural significance beyond academic work

   COMMENT :

   .....

   .....

   .....

2. **Part played in School activities and Social Life of School.**

   (i) What school offices have been held? What measure of responsibility has been given?

   OFFICES : RESPONSBILITY :

   .....

   .....

   .....

   (ii) GENERAL SOCIAL LIFE :
   Dominant part in school activities. A B C D E Practically no part in school activities.

   (iii) SPORT AND ATHLETICS :
   A B C D E

   COMMENT :

   .....

   .....

   .....

3. **Speech, etc.**
   Power of expression. Clear, Precise, Fluent. A B C D E Hesitant, Muddled, and Inadequate.

4. **Personality.**

   (i) LEADERSHIP.
   Very enterprising and ready to suggest practicable ways of doing things. A B C D E Never branches out on own. Timid in novel situations.

   (ii) PERSONAL ADJUSTMENT.
   Excellent, confident, amiable, well balanced, stable. A B C D E Poor, very nervous, anxious.

   (iii) ADJUSTMENT TO OTHERS.
   Highly popular. Works well either as member of team or as leader. A B C D E Unsociable, and unpopular. Not willing to work with others.

   COMMENT :

   .....

   .....

   .....

5. **General Suitability for Teaching.**
   Outstanding promise. Should make teacher of best type. A B C D E Not suitable.

6. How many candidates from your school are applying for admission to the four years' course here? ..... What is the position of this candidate in order of merit?

7. **Further Comment.**

Head.....

Date .....

APPLICATION FORM

REGISTRAR'S COPY

N.B.—This form should be completed in duplicate. Both copies should then be handed to your Head Master/Mistress, together with a stamped addressed envelope, so that he/she may complete and forward them to: The Head of the Education Department, The University, Edmund Street, Birmingham, 3. The forms should reach this office on or after October 1st of the year preceding that in which entry is desired, and not later than January 1st.

For Office use only

Age		H.M.		Inter-view		Letter sent	

Registrar's Remarks:

UNIVERSITY OF BIRMINGHAM

EDUCATION DEPARTMENT

Year in which entrance is desired .....

1. Name in full (Surname first) .....
2. Private Address in full.....
3. Date of birth: Day..... Month..... Year.....
4. Nationality.....
5. Last two schools attended (give name of H.M. and full postal address of schools):
   (1) .....
   (2) .....
6. If you are not at school now, give details of present occupation.....
   .....
7. QUALIFYING EXAMINATION OR EXAMINATIONS FOR ADMISSION:
   (*a*) Name of Examining Board .....
   Date .....
   Subjects passed with credit .....
   .....
   Subjects passed not with credit .....
   .....
   (*b*) State whether you hold a certificate from the Joint Matriculation Board of the Northern Universities to the effect that you have satisfied the Board's requirements for entrance upon a Degree Course ..... (Candidates should assure themselves, by writing to the Secretary of the Joint Matriculation Board, 315, Oxford Road, Manchester, that their School Certificate or Higher School Certificate, alone or combined, will satisfy the J.M.B.'s requirements for entry to the University).
   (*c*) Full particulars of subjects passed or to be presented at a Higher School Certificate Examination:
   Name of Examining Board .....
   Group and subjects, principal and subsidiary:

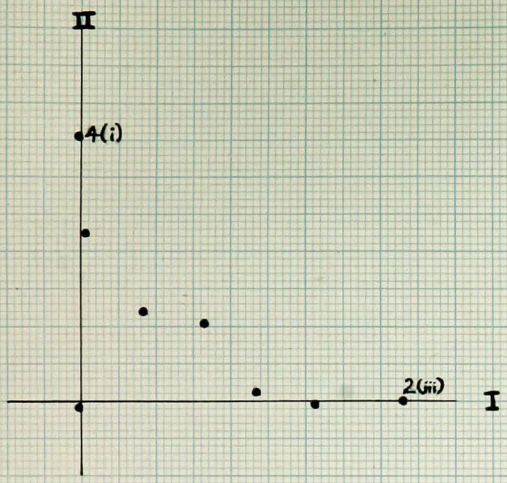
Already passed:	To be taken this session:
.....	.....
.....	.....
.....	.....

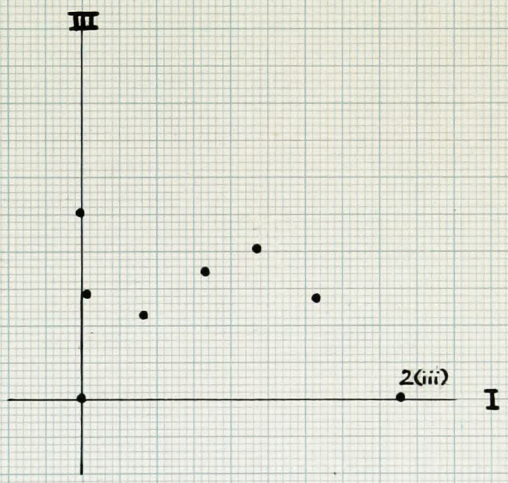
8. Do you already hold a complete Higher School Certificate? .....
9. Do you desire to read for a Degree in Arts or Science? .....
10. Are you a candidate for a General Degree or a Special Honours Course? State clearly which you want, stating subject or subjects.....
    .....
11. Have you applied to any other College for admission? ..... (1) .....
    (If so, give order of preference, including Birmingham University.) (2) .....
    (3) .....
    (4) .....
12. Have you applied for a place in this Department in any previous year..... Give year.....
13. Name and address of parent or guardian .....
    .....

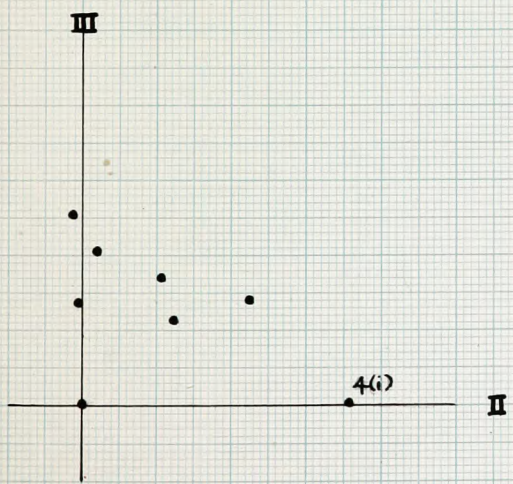
All admissions are subject to a satisfactory report from the University Medical Officer.

Intercorrelations of eight traits assessed by Head Teachers

	1	2(2)	2(3)	3	4(1)	4(2)	4(3)
1							
2(2)	44						
2(3)	-01	26					
3	24	31	02				
4(1)	44	60	38	45			
4(2)	31	44	41	55	25		
4(3)	26	53	44	32	25	51	
5	48	59	28	49	62	58	24







FINAL LOCATION OF AXES

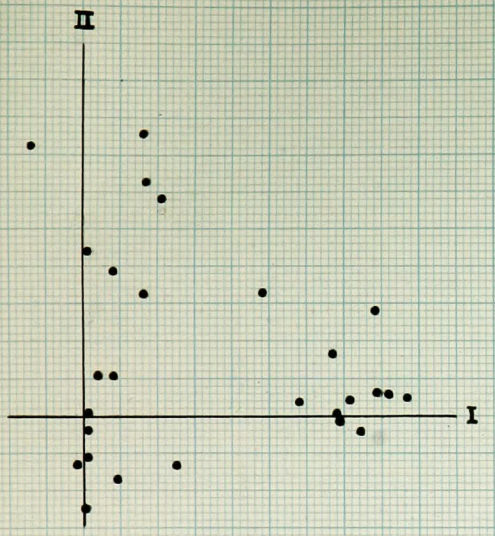
APPENDIX III

Intercorrelations between Interview ratings, Head Teachers' ratings and certain Test results

	1	2	3	4	5(1)	5(2)	5(3)	6(1)	6(2)	6(3)	7	8	HM1
1													
2	49												
3	28	49											
4	48	51	48										
5(1)	38	32	03	40									
5(2)	50	49	21	54	71								
5(3)	62	44	18	50	54	66							
6(1)	46	42	27	75	56	61	52						
6(2)	52	49	27	54	40	58	60	55					
6(3)	54	49	22	56	45	65	73	59	76				
7	59	44	15	42	43	57	61	49	56	70			
8	70	72	35	62	53	70	75	63	74	79	72		
HM1	22	31	-04	11	19	22	24	12	13	27	18	21	
HM2(2)	25	59	37	29	19	29	24	19	24	24	14	32	44
HM2(3)	05	33	71	30	-06	10	04	18	12	10	03	10	-01
HM3	27	32	00	24	34	41	37	18	26	31	08	36	24
HM4(1)	40	53	33	33	14	37	27	19	35	33	17	30	44
HM4(2)	00	38	16	22	08	22	12	13	19	22	13	19	31
HM4(3)	10	25	28	30	09	37	06	16	20	19	10	36	26
HM5	20	33	25	30	20	36	27	20	24	32	20	29	48
33(1)	09	-02	-12	-05	10	00	-01	-12	-05	-07	-07	12	07
33(2)	20	04	-08	07	04	07	11	04	09	00	02	15	02
33(3)	02	-04	-10	-01	11	07	04	-07	-04	-01	01	04	-10
33(4)	31	-01	-10	04	04	03	12	-04	01	08	05	07	-02
33(5)	03	03	-04	08	05	00	02	07	06	-09	05	08	-06
RC	05	05	-09	-08	14	08	09	-04	-01	-02	-02	08	05
AR	09	07	00	00	06	08	05	00	08	05	06	10	-06

1													
2													
3													
4													
5(1)													
5(2)													
5(3)													
6(1)													
6(2)													
6(3)													
7													
8													
HM1													
HM2(2)													
HM2(3)	26												
HM3	31	02											
HM4(1)	60	38	45										
HM4(2)	44	41	55	25									
HM4(3)	53	44	32	25	51								
HM5	59	28	49	02	58	24							
33(1)	04	-15	34	05	-04	-06	04						
33(2)	01	-11	05	02	-11	01	05	43					
33(3)	-11	-07	07	05	03	03	09	40	43				
33(4)	-13	07	13	03	00	00	10	40	43	44			
33(5)	05	02	04	06	02	10	08	12	31	23	39		
RC	05	-11	06	12	-02	-01	09	28	18	20	11	13	
AR	07	06	02	06	-02	07	02	17	17	07	24	30	17
	HM2(2)	HM2(3)	HM3	HM4(1)	HM4(2)	HM4(3)	HM5	33(1)	33(2)	33(3)	33(4)	33(5)	RC

1 to 8 Interview ratings.
HM1 to HM5 Head Teachers' ratings.
33(1) to 33(5) Group Test 33
RC Relation Completion test.
AR Adult Reasoning test.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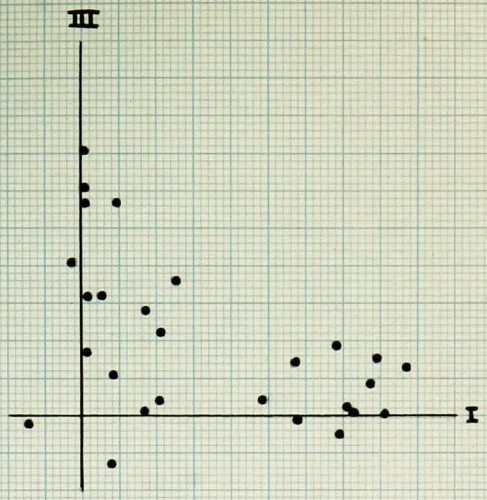
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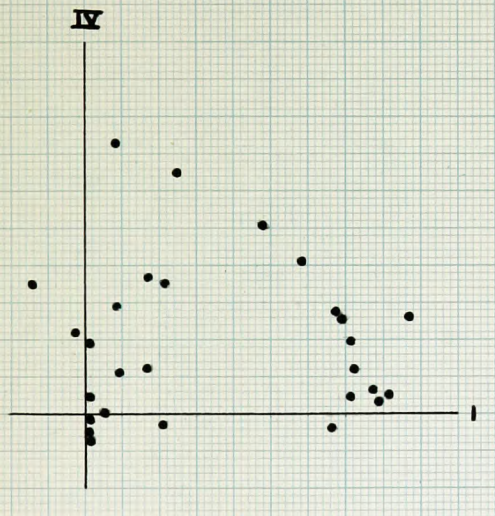
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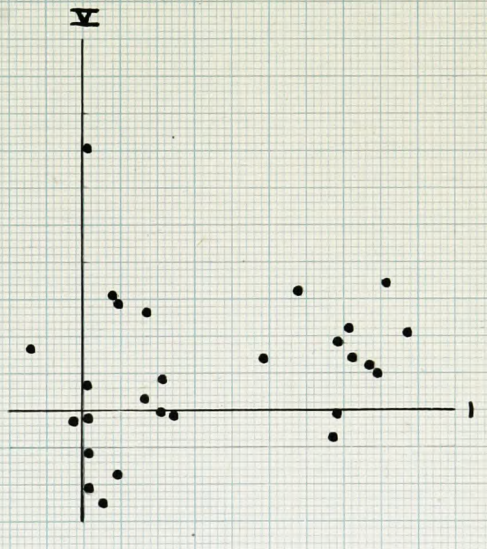
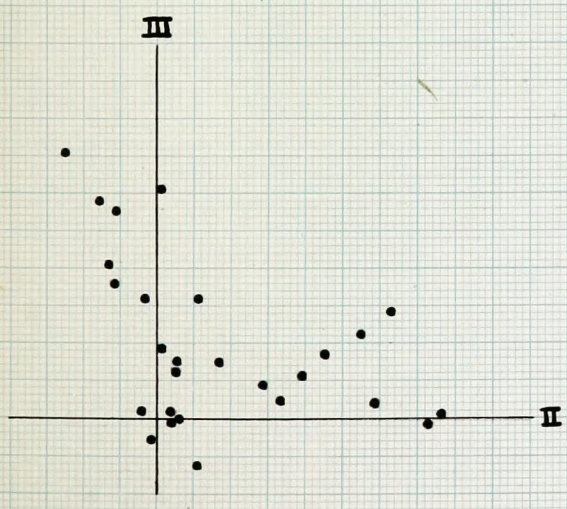
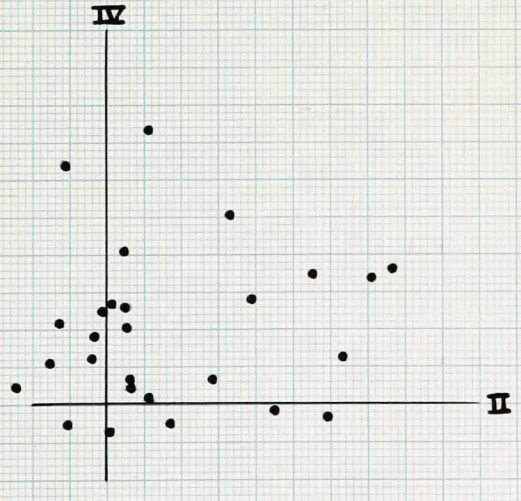
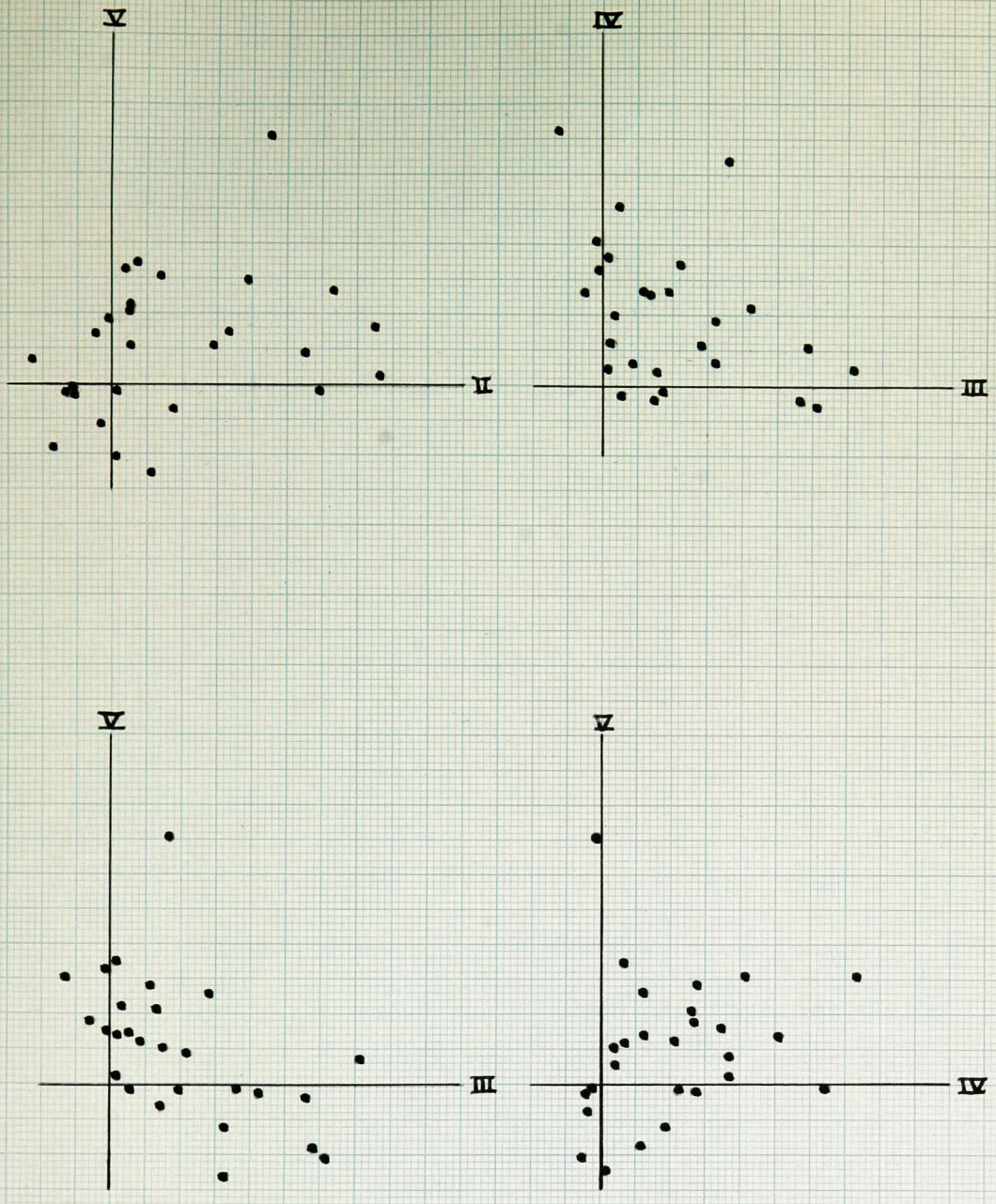

V
I


III
II


IV
II



FINAL LOCATION OF AXES

UNIVERSITY OF BIRMINGHAM INSTITUTE OF EDUCATION

Department of Research and Higher Degrees

DO NOT OPEN THIS UNTIL YOU ARE TOLD TO DO SO

REASONING TESTS FOR ADULTS

Time allowed 15 *minutes*

Instructions :

Inside this booklet you will find a number of reasoning problems with suggested answers which you have to examine and state whether they are sound or not. An example is given below these instructions. You must assume first that the given premisses (i.e., the statements underlined) are true. The problem is, in each case, this : granted that the assumptions are true, is the other statement necessarily true ? If you think the argument is sound, underline the word " Yes " on your answer sheet and cross out the word " No." If the argument is unsound cross out the word " Yes " on your sheet and underline " No."

If the answer is unsound, you have to show which of the sentences (i-iv) given below that argument, gives the best reason why the conclusion does not follow from the given premisses and you will then mark your selected reason with a X on your answer sheet. Remember that you must assume that the underlined statements are true.

NOTE.—Marks will be deducted for wrong answers so that mere guessing is penalised.

Example :

Those who are successful in Test A are also likely, but not certain, to be successful in Test B. Those who are successful in Test C are certain to be successful in Test A.

If you take Test A you need not take Test C but if you take Test C you must take Test A also.

John was successful in Test B, he must therefore have passed Test C. Yes /No

(i)	He might have taken Test A alone.	i
(ii)	He might have failed in either Test A or C.	ii
(iii)	There is nothing to say that he took either Test A or C.	iii
(iv)	He might have failed in Test C and passed in Test A.	iv

THIS BOOKLET SHOULD NOT BE MARKED IN ANY WAY. ALL ANSWERS SHOULD BE ON YOUR ANSWER STRIP.

1 "None but those who are contented with their lot in life can justly be considered happy. But the truly wise man will always make himself contented with his lot in life, and, therefore, it follows that he may justly be considered happy."

(i) A wise man can force himself to be contented with his lot in life, but the very fact of this compulsion will prevent his being truly happy.

(ii) Those who are not content with their lot in life are often happy, for there is often more happiness in striving to attain one's desire than in the actual attainment.

(iii) The fact that only those who are contented with their lot in life can justly be considered happy does not imply that all those who are contented with their lot can justly be considered happy.

(iv) The conclusion may be true or not, it will depend on the standard of happiness. Content and happiness are not the same thing.

2. "None but Whigs vote for Mr. B. All who vote for Mr. B. are ten-pound householders. Therefore none but Whigs are ten-pound householders."

(i) Only Whigs vote for Mr. B., yet all Whigs need not do this, so that there may be Whigs who are not ten-pound householders.

(ii) All those who vote for Mr. B. are both Whigs and ten-pound householders, yet there may be ten-pound householders who do not vote for him, and hence need not be Whigs.

(iii) Even if none but ten-pound householders vote for Mr. B., it is not to say that some of them do not vote for his opponent, and hence are not Whigs.

(iv) There may be voters who are not Whigs, yet who vote for Mr. B. on personal rather than on political grounds, and these will also be ten-pound householders.

3. "No school-boy can be expected to understand Constitutional History, and none but school-boys can be expected to remember dates; so that no one can be expected both to remember dates and to understand Constitutional History."

(i) We cannot assume that this conclusion is true. College students may easily do both, for they are sufficiently developed intellectually to understand Constitutional History, while they are not old enough to have forgotten the dates they learned at school.

(ii) One cannot say that no school-boy can be expected to understand Constitutional History. A boy who is intelligent and well taught may easily do so.

(iii) School-boys should not be expected to remember dates exactly, for this is an unsound method of teaching History, so that the whole argument is invalidated.

(iv) The premisses are incomplete. No mention is made of school-girls, who are able to remember dates as well as boys.

4. " If you argue on a subject which you do not understand, you will prove yourself a fool ; for so to argue is a mistake fools always make."

(i) The statement is not sufficient to define "a fool." Only one characteristic is given, and a man may not be a fool only because he makes this mistake, but for other reasons, too.

(ii) This argument is unsound, because a wise man may be able to argue on a subject which he does not understand without giving himself away, while a fool could not.

(iii) It is not logical to conclude that a man is a fool because he acts like one in this one particular instance.

(iv) Although fools always make this mistake, it is not stated that all who make this mistake are fools, so that others who are not fools may do so too.

5. " Everyone is either well informed of the facts or already convinced on the subject ; no one can be at the same time both already convinced on the subject and amenable to argument ; hence it follows that only those who are well informed of the facts are amenable to argument.

(i) This conclusion is the converse of the true one, for those who are well informed of the facts will be sure of their ground and so will *not* be amenable to argument.

(ii) A man may be convinced on the subject, yet if a good argument is ably put before him he may alter his opinion.

(iii) There is no reason why everyone should be either well informed of the facts or already convinced on the subject ; there may be people who have never heard of the subject at all.

(iv) The first premiss is not clear, for some may be both well informed of the facts and already convinced on the subject, and according to the second premiss these will not be amenable to argument.

6. " No soldiers should be brought in to the field who are not well qualified to perform their part ; none but veterans are well qualified to perform their part ; therefore, none but veterans should be brought into the field."

(i) If only veterans were brought into the field, young soldiers would never have a chance to learn, and when the veterans died there would be no one to replace them. The conclusion is, therefore, unsound.

(ii) Soldiers could not become veterans without going into the field as recruits, so the whole argument is false.

(iii) It is a mis-statement to say that none but veterans are well qualified to perform their part, since young soldiers make up for their lack of experience by their enthusiasm.

(iv) Veterans may not be well qualified to perform their part for they may be too old, in which case the conclusion is invalid.

7. " This pamphlet contains seditious doctrines. The spread of seditious doctrines is dangerous to the State. Therefore, this pamphlet must be suppressed."

(i) It is not stated that everything dangerous to the State must be suppressed, so in the premisses given there is no reason for the suppression of the pamphlet ; and in any case it is not stated that the pamphlet would spread seditious doctrine.

(ii) The spread of seditious doctrines is not always dangerous to the State, for if the State is stable seditious doctrines will not affect it.

(iii) The conclusion is incorrect, for the doctrines in the pamphlet may only appear to be seditious in the opinion of some people. Others may not consider them so.

(iv) To suppress the pamphlet may not of itself avert the danger. The doctrines expressed in it can still be spread verbally by their originators, so other measures may also be necessary.

8. " All the students are either industrious or intelligent. Either industry or intelligence will ensure success in the examination. So all the students will pass the examination."

(i) This conclusion is incorrect, for a student may fail in the examination through misfortune ; for instance, he may feel unwell when the examination takes place.

(ii) A student may be industrious or intelligent, yet may be disqualified in the examination for bad conduct, e.g., copying from other candidates.

(iii) Either industry or intelligence alone is surely insufficient for a success. A combination of the two is needed.

(iv) If a student is neither industrious nor very intelligent he may pass if by good fortune he is asked questions bearing on the little knowledge he has.

9. " If all the accused were innocent, some at least would have been acquitted. We may infer; then, that none were innocent, since none have been acquitted."

(i) The innocent are often condemned to suffer for the guilty. Condemnation is no proof of guilt.

(ii) The guilt of some may have placed all in a bad light, so that none would be acquitted.

(iii) If only some of the innocent would be acquitted in any case, then some were not acquitted when they ought to have been.

(iv) We are only told that some of the accused would be acquitted if all were innocent. The number innocent could be less than all, but still greater than nothing, and so insufficient to secure any acquittals.

10. " Only Conservatives—and not all of them—are Protectionists; only Liberals—and not all of them—are Home Rulers; (that is, there are some Liberal Unionists); but both parties (Conservatives and Liberals) contain supporters of women's franchise. Hence (*a*) only Unionists—and not all of them—are Protectionists; while (*b*) the supporters of women's franchise contain both Unionists and Free Traders." N.B.—Unionists—Those who are not Home Rulers. Protectionists: Those who are not free traders.

NOTE.—You have to decide whether statement (*a*) is correct or incorrect and whether statement (*b*) is correct or incorrect, i.e., there are two sets of answers. The two sets of statements below refer respectively to statement (*a*) and to statement (*b*).

10 (*a*) (i) Unionists need not be Conservatives, they may be Liberals, so that although Conservatives are Protectionists, Unionists need not be.

(ii) There is nothing in the given statement to suggest that the Conservatives who are Unionists are identical with the Conservatives who are Protectionists.

(iii) In the given premisses, Unionists are only found in the Liberal Party which contains no Protectionists. Thus Unionists cannot be Protectionists.

(iv) The questions of Unionism and of Protection are entirely independent of each other. Thus no conclusion can be drawn as to whether believers in Protection are also believers in Unionism.

10 (*b*) (i) The Conservatives who support women's franchise need be neither Unionists nor Free Traders, while the Liberals need not be Unionists. Thus there may be no Unionists among the supporters of women's franchise.

(ii) The Liberals who support women's franchise may be those who are Home Rulers, and the Conservatives, just those who are Protectionists. Thus there may be neither Free Traders nor Unionists among the supporters of women's franchise.

(iii) The Liberals who support women's franchise may be all Free Traders, and the Conservatives who support women's franchise may be those who are not Protectionists, so that these supporters may all be Free Traders.

(iv) The question of women's franchise is one which is not affected by considerations of Unionism or Free Trade, so these considerations are irrelevant.

Press of The Birmingham Printers Ltd.

Relation-Completion Test.

LIST OF WORDS.

N.B.—Not all of these are needed.

again
although
because
but
consequently
especially
even
except
for
further
hence
however
if
indeed
instance
moreover
nevertheless
now (not in the sense "nowadays")
rather
since
so
than
then
therefore
though
thus
unless
when
while
yet

RELATION—COMPLETION TEST.

Fill in the blanks in the passages below with the words, selected from the list provided, that give the best sense to the passage as a whole. Only one word is to be written on each dotted line. Notice that the word **AND** must not be used.

FRIENDSHIP.

Friendship is certainly one of the most valuable things in life ; ..... there are some who think it is the best thing a man can have, ... it may lighten sorrow ..... our friend sympathizes with us, and it may double our happiness ..... he rejoices with us. ..... it can be enjoyed in good fortune and in ill.

The strong friendship between some famous men has become proverbial : .... that between David and Jonathan. Such a bond of friendship is sometimes said to be greater ..... than that between man and wife : ..... this is surely an exaggeration, ... if we think only of the happiest marriages.

Relation-Completion Tests.

INSTRUCTIONS.

Fill in the blanks in the passage below with the words, selected from the list provided, which give the best sense to the passage as a whole. Only one word is to be written in each space. Notice that the word **and** must not be used.

THE DAILY PRESS.

The development of the daily press is of great social significance. In the first place the daily paper costs only a fraction of what it did a century ago and ..... (1) it is purchased by a vastly greater number ;..... (2) it has been stated that .... (3) in the poorest districts in London, on the average one paper is bought per day for every family. ..... (4) this does not indicate the full extent of publicity ; ..... (5) many a poor man peruses two or three newspapers the same evening at a public reading room. It has been argued that this wide publication is essentially democratic, ... (6) in the long run the views supported by the majority will obtain the widest publicity ; and there is some truth in this contention, ... (7) no paper could continue indefinitely if it advocated views strongly opposed by the majority of its readers. ..... (8) there are serious limitations to the extent to which this is true ; ..... (9) a modern paper depends financially more on its advertisements than on the money paid by subscribers. ..... (10) if a newspaper can get a circulation among a well-to-do purchasing public,..... (11) if limited in number it will attract advertisements and..... (12) the paper can afford to offer special attractions to induce those who do not agree with its politics to purchase it.

APPENDIX IV

Analysis corresponding to Chapter IV. Section D

A comparison between different Interviewers using a Rating Schedule

Trait 1. Interests

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	2649	5	529.8
Interviewers	85	5	16.0
Times	130	5	26.0
Error	601	20	30.05
Total	3465	35	

For Interviewers $F = \frac{16}{30.05}$ Not Significant

For Times $F = \frac{26}{30.05}$ Not Significant

Trait 2. School Activities

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	3080	5	616
Interviewers	247	5	49.4
Times	111	5	22.2
Error	679	20	33.9
Total	4117	35	

For Interviewers $F = \frac{49.4}{33.9} = 1.46$ Not Significant

For Times $F = \frac{22.2}{33.9}$ Not Significant

Trait 3. Physical Activities

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	3779	5	755.8
Interviewers	233	5	46.6
Times	28	5	5.6
Error	648	20	32.4
Total	4688	35	

For Interviewers $F = \frac{46.6}{32.4} = 1.44$ Not Significant

For Times $F = \frac{5.6}{32.4}$ Not Significant

Trait 4. Physical Bearing. See Text

Trait 5(1). Dialect

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	1970	5	394
Interviewers	328	5	65.6
Times	171	5	34.2
Error	571	20	28.6
Total	3040	35	

For Interviewers $F = \frac{65.6}{28.6} = 2.29$ Not Significant

For Times $F = \frac{34.2}{28.6} = 1.20$ Not Significant

Trait 5(2). Voice Quality

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	635	5	127
Interviewers	531	5	106.2
Times	45	5	9
Error	614	20	30.7
Total	1825	35	

For Interviewers $F = \frac{106.2}{30.7} = 346$ Significant at 5% level

For Times $F = \frac{9}{30.7}$ Not Significant

Trait 5(3). Power of Expression

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	1448	5	289.6
Interviewers	364	5	72.8
Times	441	5	88.2
Error	437	20	21.9
Total	2690	35	

For Interviewers $F = \frac{72.8}{21.9} = 3.32$ Significant at 5% level

For Times $F = \frac{88.2}{21.9} = 4.03$ Significant at 5% level

Trait 6(1). General Appearance

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	814	5	162.8
Interviewers	633	5	126.6
Times	438	5	87.6
Error	667	20	33.4
Total	2552	35	

For Interviewers $F = \frac{126.6}{33.4} = 3.79$ Significant at 5% level

For Times $F = \frac{87.6}{33.4} = 2.62$ Not Significant

Trait 6(2). Personal Adjustment

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	1774	5	354.4
Interviewers	108	5	21.6
Times	237	5	47.4
Error	448	20	22.4
Total	2567	35	

For Interviewers $F = \frac{21.6}{22.4}$ Not Significant

For Times $F = \frac{47.4}{22.4} = 2.12$ Not Significant

Trait 6(3). Adjustment to Interviewers.

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	1514	5	302.8
Interviewers	173	5	34.6
Times	410	5	82.0
Error	510	20	25.5
Total	2607	35	

For Interviewers $F = \frac{34.6}{25.5} = 1.36$ Not Significant

For Times $F = \frac{82.0}{25.5} = 3.22$ Significant at 5% level

Trait 7. Sense of Vocation

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	1031	5	206.2
Interviewers	274	5	54.8
Times	374	5	74.8
Error	947	20	47.4
Total	2626	35	

For Interviewers $F = \frac{54.8}{47.4} = 1.16$ Not Significant

For Times $F = \frac{74.8}{47.4} = 1.58$ Not Significant

Trait 8. Suitability for Teaching

Source of Variance	Sum of Squares	d.f.	Mean Square
Between Candidates	1952	5	390.4
Interviewers	144	5	28.8
Times	205	5	41.0
Error	205	20	10.2
Total	2506	35	

For Interviewers $F = \frac{28.8}{10.2} = 2.82$ Significant at 5% level

For Times $F = \frac{41.0}{10.2} = 4.02$ Significant at 5% level

Total Mark Awarded

At Time			By Interviewer		
	1	3752		A	4119
	2	3830		B	3655
	3	3699		C	3691
	4	3685		D	3754
	5	3630		E	3725
	6	4040		F	3692
Total		22,636			22,636

STATEMENT OF INTERESTS

UNIVERSITY OF BIRMINGHAM

DEPARTMENT OF EDUCATION

NAME

Check List

ART etc
- Painting
- Handicraft

COLLECTING
- Stamps
- Coins
- Eggs

CINEMA, THEATRE
- Amateur Dramatics

DOMESTIC
- Housework
- Gardening

GAMES
- Athletics

LITERARY

MECHANICAL
- Tinkering

MUSICAL
- Listening
- Playing

POLITICAL

RELIGIOUS

SOCIAL
- Parties
- Dancing
- Discussion

SCIENTIFIC
- Radio
- Photography
- Nature Study

TRAVEL

YOUTH WORK
- Scouts
- Guides

Please give some details of your interests below. The check list is merely to refresh your memory

Are there any interests you would like to have developed without so far having had the opportunity to do so?

DO NOT TURN OVER THIS PAGE UNTIL INSTRUCTED.

UNIVERSITY OF BIRMINGHAM

DEPARTMENT OF EDUCATION.

GENERAL INFORMATION TEST.

Name School

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1. On each of the following two pages you will find -

   (a) a numbered list of well known people, printed down the left side;

   (b) a number of descriptions of some of these people, printed down the middle.

2. When you are told, turn to the first page, quickly scan the list of names, then go through the list of descriptions and put in the space provided on the right the number of the person you think the description fits. You may look through the list of names as often as you like.

Example:

1.	Dennis Compton	Lancashire cotton-weaver who is
2.	Nigel Belchin	now Minister of Education. ..4...
3.	J.Stalin	English writer. Author of "The
4.	George Tomlinson	Small Back Room","Mine Own
5.	Stewart Granger	Executioner". ..2...
6.	Myra Hess	English actor of stage and screen. Starred in"Captain Boycott" and"Adam and Eveline" ..5...

3. Not all the names will be required.

4. Some names may be used to fit more than one description.

5. Put a number even if you are not certain. You will not lose marks for wrong answers.

6. You have 15 minutes for both sheets. Go on to sheet 2 as soon as you want to.

7. All the names for sheet 1 are on sheet 1. All the names for sheet 2 are on sheet 2.

8. Work as quickly as you can.

DO NOT TURN OVER.

1. RALPH BUNCH — Norwegian. Secretary General of the United Nations since 1946.

2. CYRIL GARBETT — English musician and conductor of the B.B.C. Symphony Orchestra.

3. VAN GOGH — Australian Cricket Captain. Knighted in January 1947.

4. FREDERICK GRISEWOOD — Dutch women athlete. Mother of two children. Winner of three sprints in 1948 Olympic Games.

5. TRYGVE LIE — British Army General. Famous for his victory at El Alamein.

6. ARTHUR TEDDER — English Historian. Author of "English Social History".

7. THOMAS BEECHAM — English film producer now working in America. Produced "Rope", "Spellbound", "Lifeboat" etc.

8. MOIRA SHEARER — War-time President of the U.S.A. Originator of 'Lend-Lease'. Died 1945.

9. RICHARD MURDOCH — Supreme Commander of Allied land forces during 1939-45 war. Now President of Columbia University, U.S.A.

10. DWIGHT EISENHOWER — Dutch painter who is notable for the vivid and intense colours in his paintings. Cut off his own ear and eventually shot himself in a fit of depression.

11. STAFFORD CRIPPS — Chancellor of the Exchequer. Apostle of "Productivity" and self denial.

12. G.M. VALVALYAN — Ballet dancer who appeared in "Red Shoes" with Robert Helpmann.

13. JOHN GALSWORTHY — Broadcaster best known for his work in Much-Binding-in-the-Marsh.

14. STUART HIBBERD — English writer and dramatist of the earlier years of this century. Author of "The Forsyte Saga" Died in 1933

15. FRANKLIN D ROOSEVELT — War-time R.A.F. leader in the Middle East and Europe. Now Chief of the Air Staff.

16. ADRIAN BOULT — Medical Scientist. Author of "Mathematics for the Million" and "Science for the Citizen".

17. EDMUND RUBBRA — English musician and conductor who recently celebrated his 70th birthday. Brought opera to England.

18. RUSSELL VICK — Well-known for his biting wit.

19. F.E.BLANKERS -KOEN — American man of colour who became head of the United Nations Commission to Palestine after the assassination of Count Bernadotte.

20. JANCELOT HOGBEN — Senior Announcer of the B.B.C. Has been broadcasting since 1924.

21. ALFRED HITCHCOCK

22. ERIC BARKER

23. BERNARD MONTGOMERY

24. DON BRADMAN.

GO STRAIGHT ON TO PAGE 2.

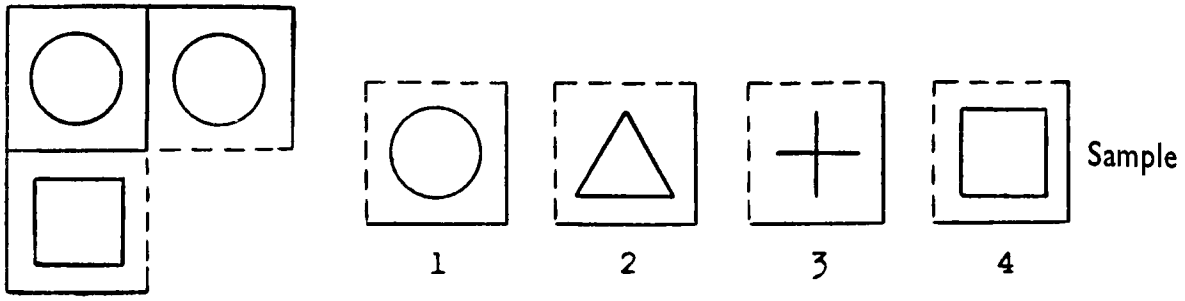
1. PIC.SSO — English cricketer. Capt in of Test terms against South Afric and New Zeal nd.
2. M.X PL NCK — High Court judge. Ch irm n of the tribun l held in 1948 in which Sidney Stanley figured so prominently.
3. N.G.M NN
4. EDITH SUMM.R -SKILL — American Negro singer of stage nd film fame. Champion of Negro rights.
5. M LCOLM S.RGENT — Present Archbishop of Canterbury.
6. G.NDHI — English philosopher. Broadcaster of the first series of Reith lectures.
7. P UL ROBESON — One time trade union leader now Secretary of State for Foreign Affairs.
8. ANEURIN BEVAN — Scottish comedian of radio, stage and screen. Sang "I belong to Glasgow". Died in 1947 after falling from a window.
9. WILLIAM J. SLIM — Woman doctor. Mother of two children. Now Parliamentary Secretary to the Ministry of Food
10. BERTR ND RUSSELL — German scientist, now living in America. Creator of the Theory of Relativity.
11. J.D.BERNAL — Modern French painter particularly fond of showing a person's profile and full face together on the same head.
12. WILL FYFFE
13. G.J.LYNDSEY
14. A.S.WINT — English mathematician who wrote under the name of Lewis Carroll.
15. HARRY S. TRUM N — Young English composer, especially well known for his operas which include "Albert Herring" and "Peter Grimes".
16. EVE CURIE — President of the U.S.A. Elected in 1948 in spite of general forecast of his defeat.
17. B.ROBS. ORCZY — Apostle of Indian independence and peace. Assassinated in 1948.
18. GEOFFREY FISHER — Jamaican runner. Winner of 400 metres in 1948 Olympic Games.
19. ERNEST BEVIN — Woman author. Creator of "The Scarlet Pimpernel" Died in 1947.
20. E.M.S. BL CKETT — French physicist. Biographer of her famous mother who discovered Radium.
21. COMPTON M CKENZIE — Author of "Carnival" and "The Four Winds of Love". One time resident member of the BBC Brains Trust.
22. BENJAMIN BRITTEN — English scientist who was recently refused a visa for USA. Author of "The Social Function of Science".
23. CHARLES DODGSON
24. ALBERT EINSTEIN

YOU MAY TURN BACK TO PAGE I IF YOU WISH.

DO NOT MARK THIS PAGE WITH YOUR PENCIL

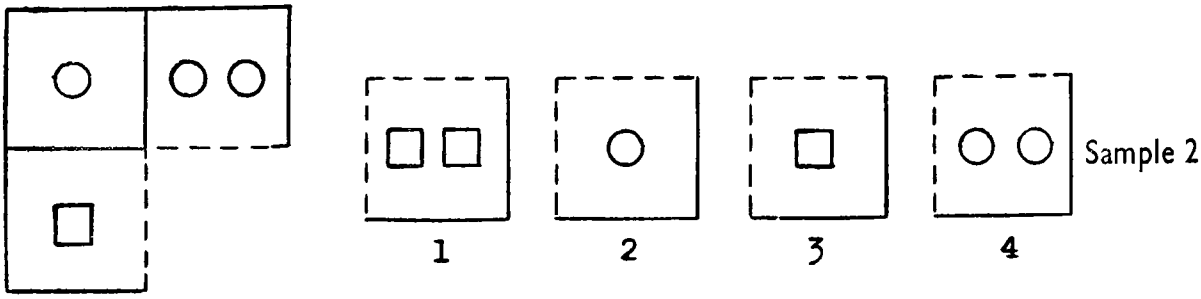
PRACTICE FOR TEST 1

One of the pieces numbered 1, 2, 3 and 4 is the missing corner of the large square on the left. Which is it? The bottom two corners should be like one another in the same way that the top two corners are alike.



You will find the answer in the box opposite the words "Sample 1" on the answer sheet.

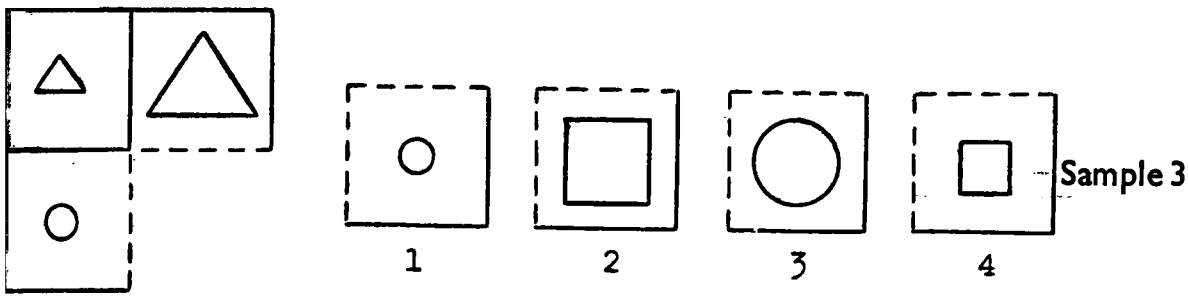
Now try this one:—

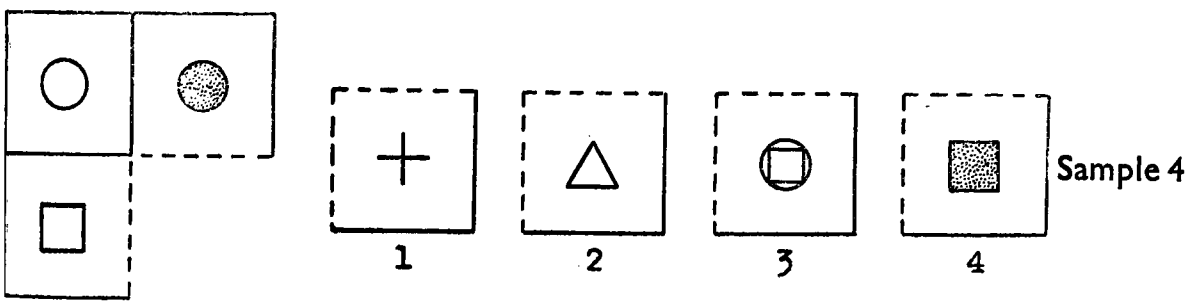


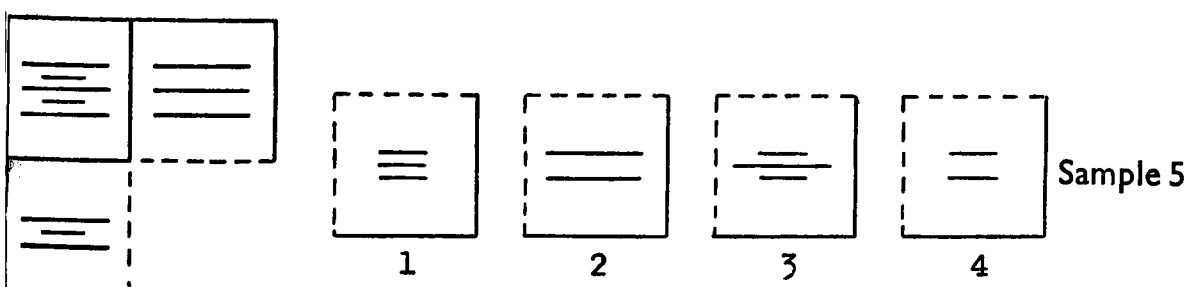
Write your answer on the answer sheet in the box for Sample 2.

DO NOT MARK THIS PAGE WITH YOUR PENCIL

Now do these. Write your answers in the boxes for Sample 3, Sample 4 and Sample 5 on the answer sheet.





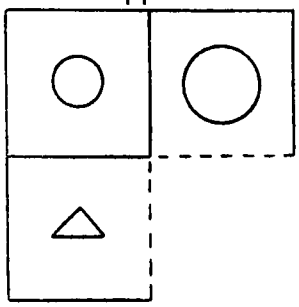


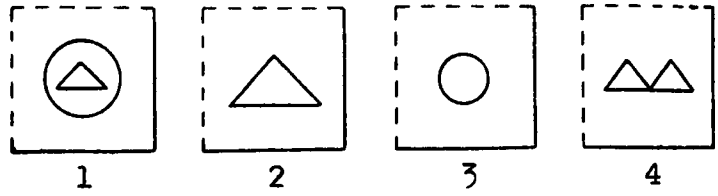
DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

DO NOT MARK THIS PAGE WITH YOUR PENCIL

TEST 1

Which of the four pieces on the right is the one missing from the large square on the left? Write your answers on the answer sheet in the spaces marked with the same letter as appears at the right of each question.





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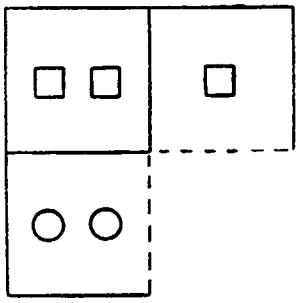

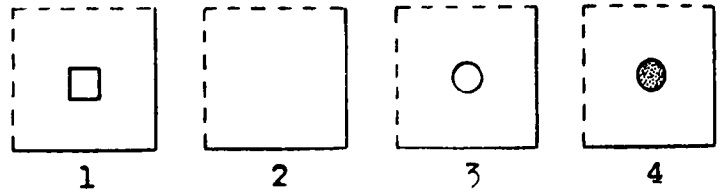

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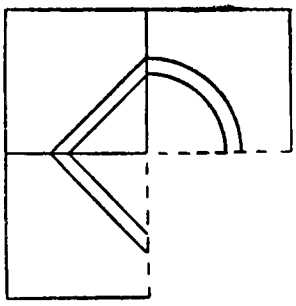

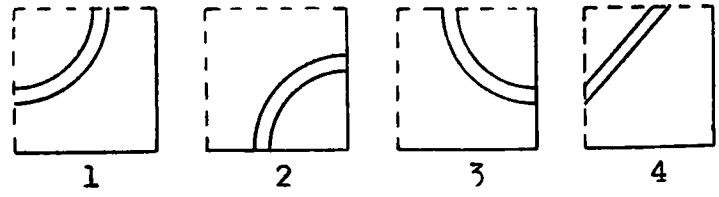

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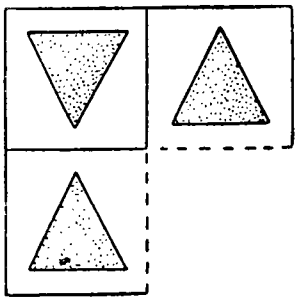

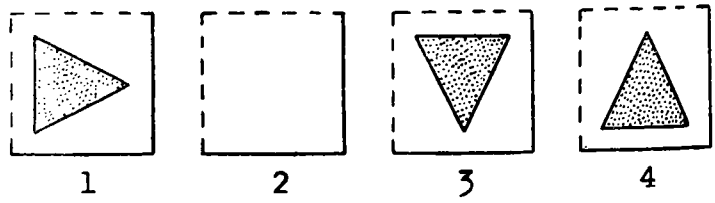

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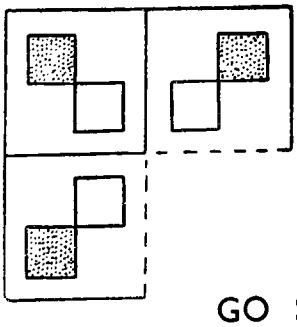

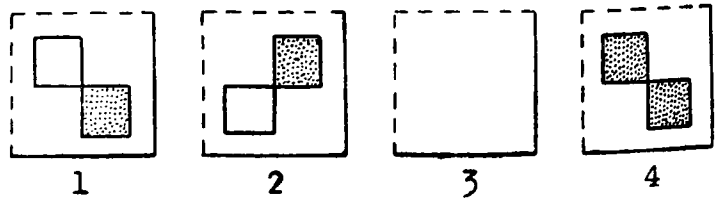

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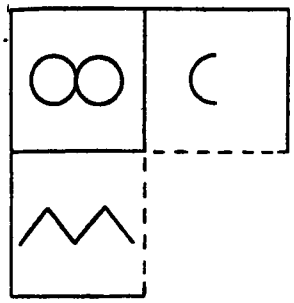

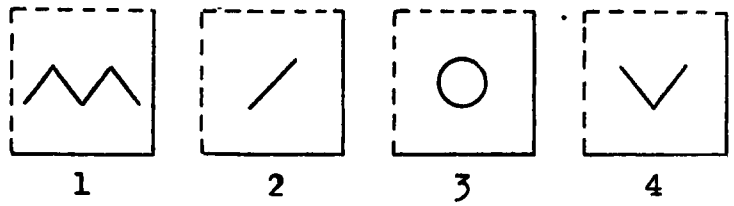

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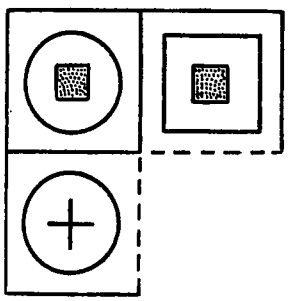

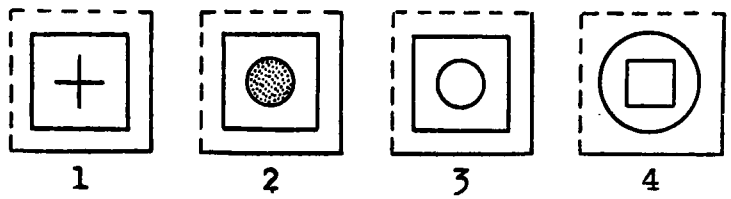

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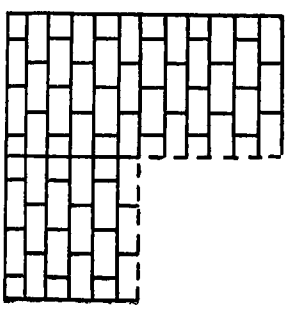

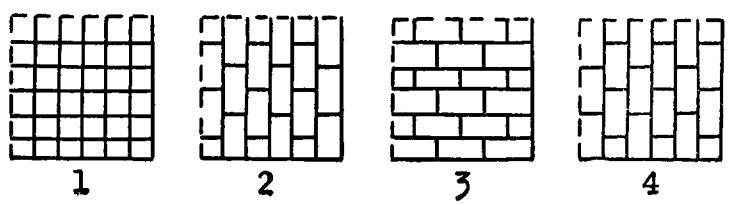

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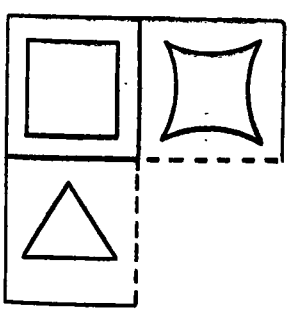

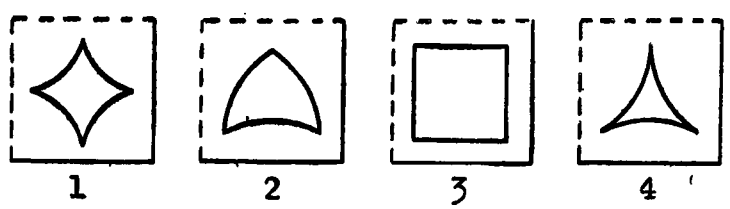

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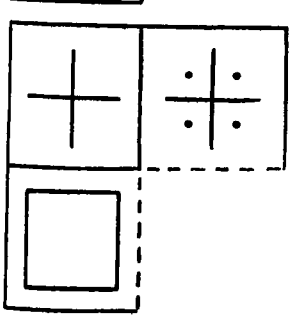

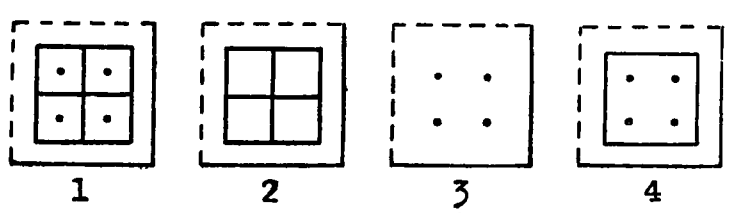

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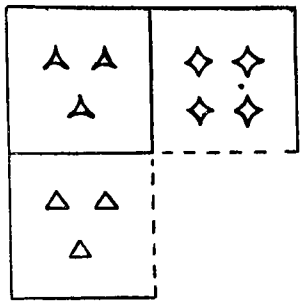
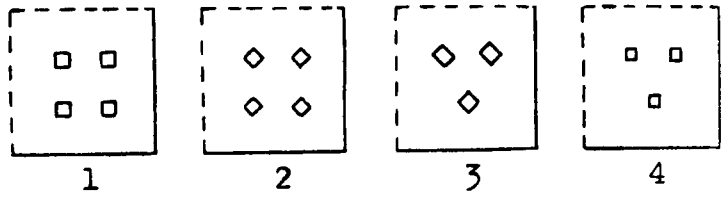
TEST 1





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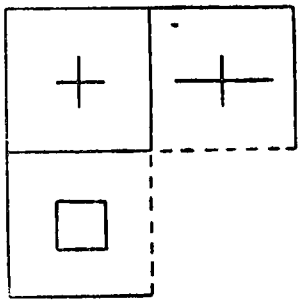

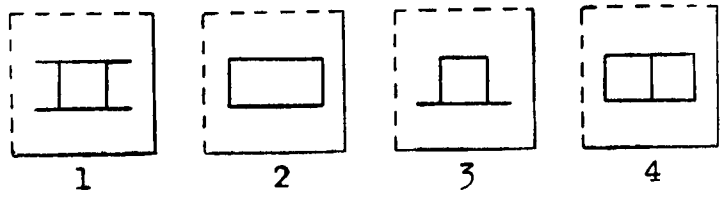

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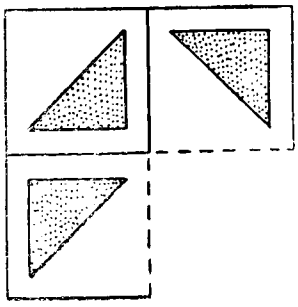

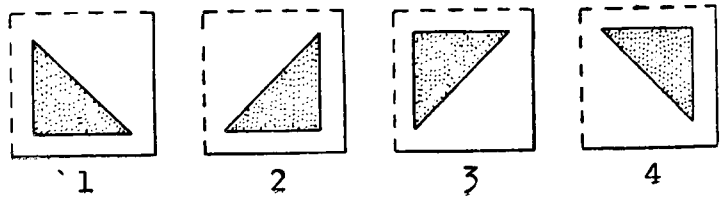

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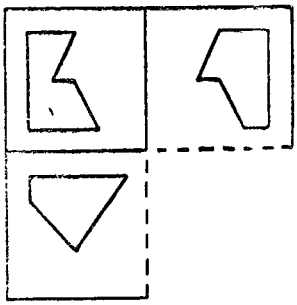

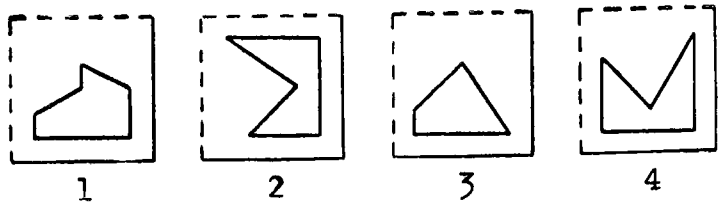

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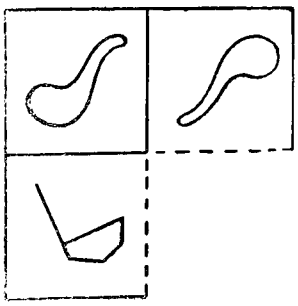

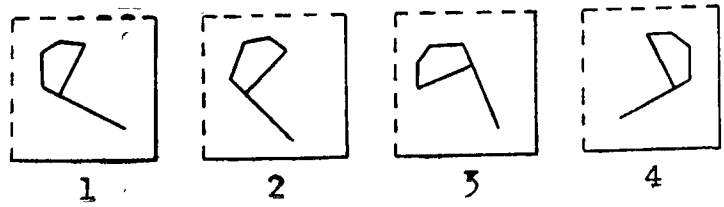

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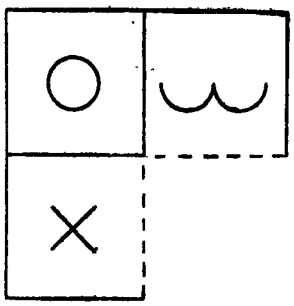

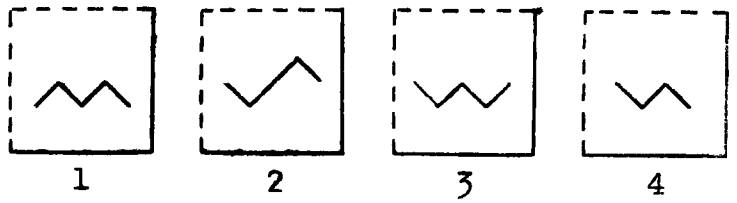

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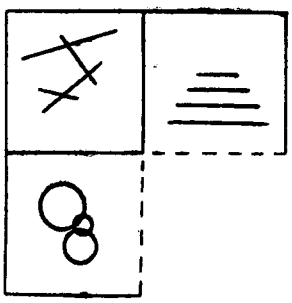

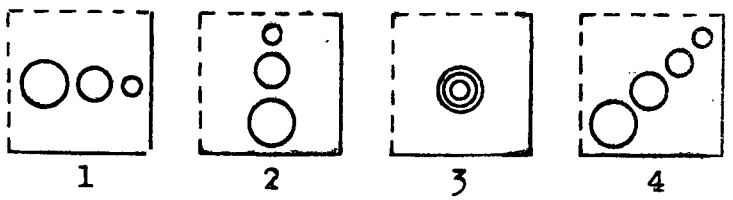

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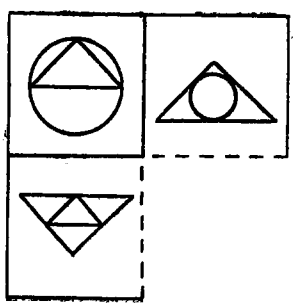

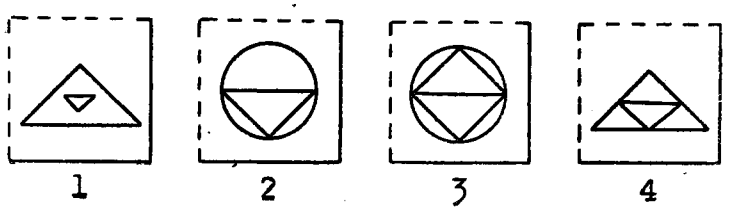

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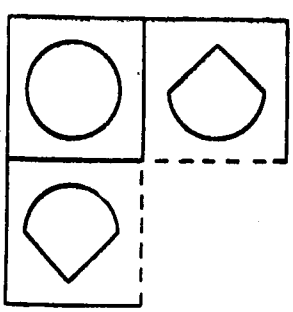

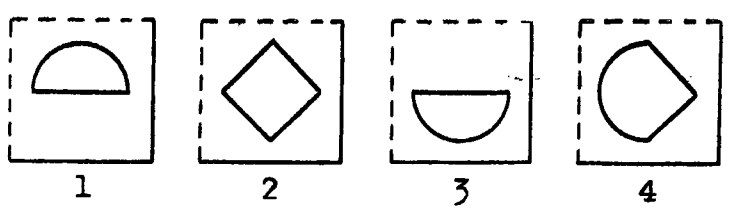

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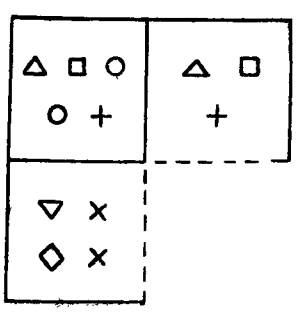

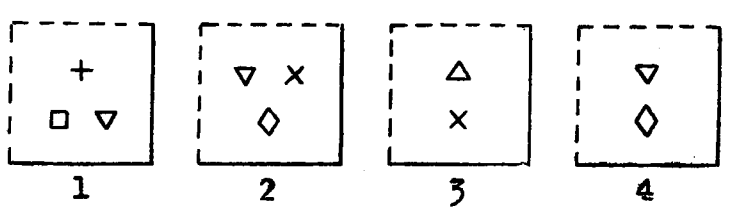

T

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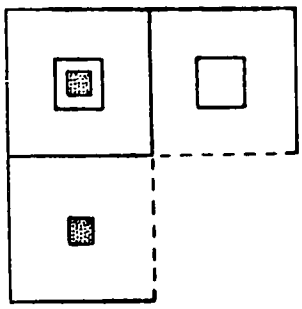
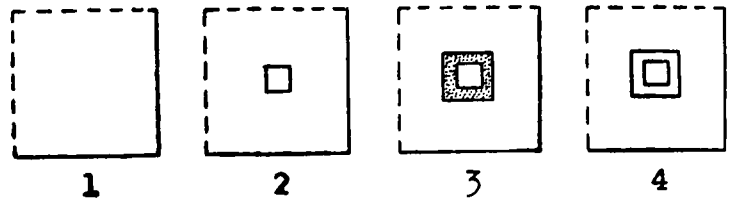
TEST 1





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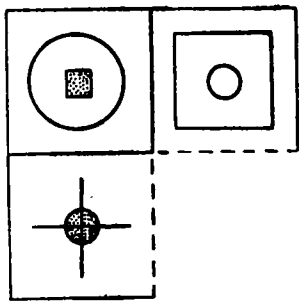

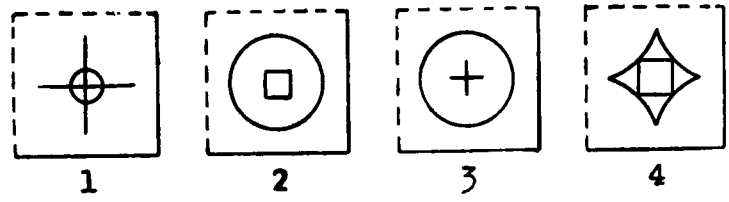

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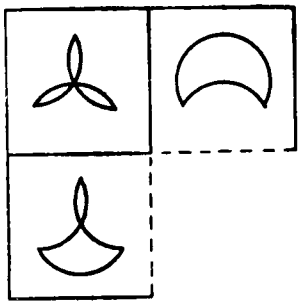

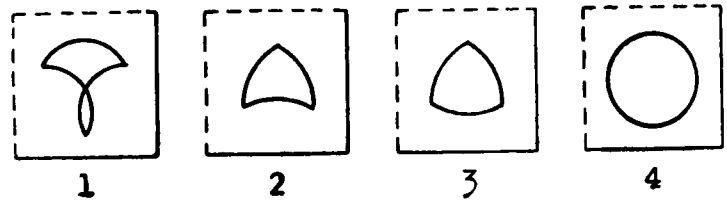

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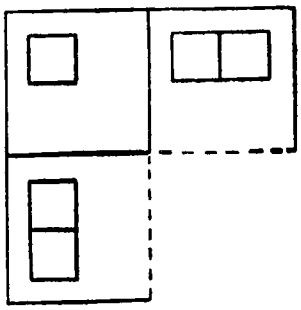

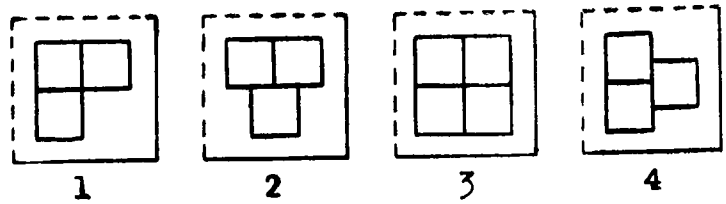

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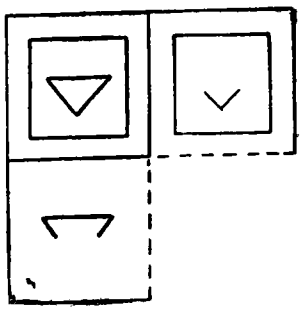

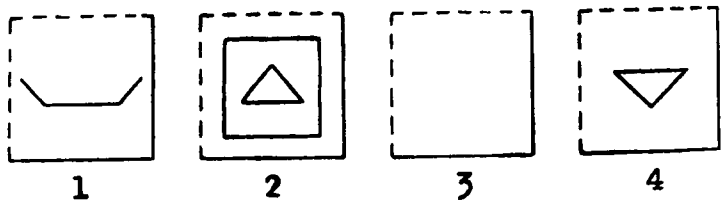

Y

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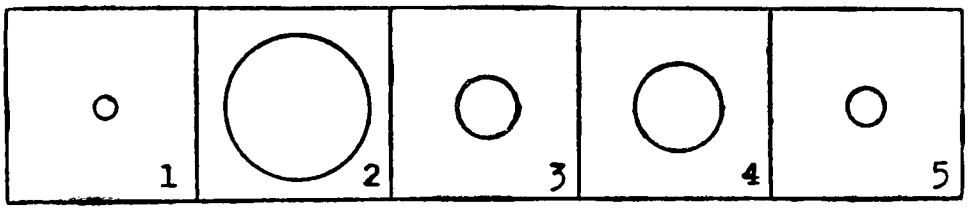
PRACTICE FOR TEST 2

The drawings inside the squares marked 1, 2, 3, 4 and 5 would be arranged in order if two of them changed places. Which two?

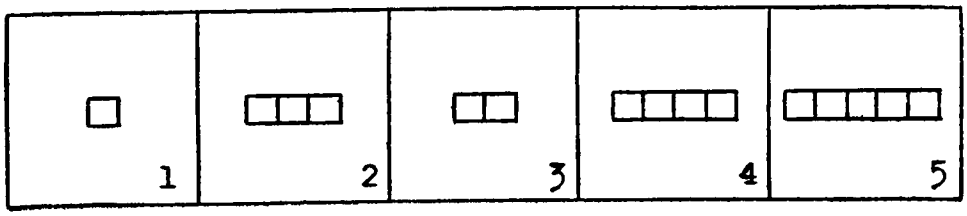
Try this one. You will notice that the circles can be arranged in order of size. The answer is in the box opposite "Sample 1" on the answer sheet.



Sample 1

Now try this one. When arranged in order there will be one small square in the first place, two small squares in the second place, three small squares in the third, and so on. Which two should change places?

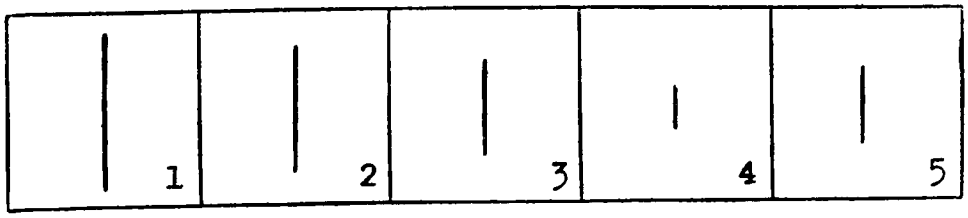
Write your answer in the box for Sample 2 on the answer sheet.



Sample 2

Now try this one. The lines should be arranged in order of length, the longest on the left and the shortest on the right.

Write your answer in the box for Sample 3 on the answer sheet.



Sample 3

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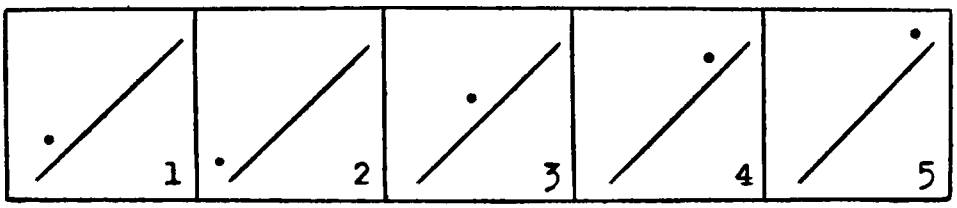
Now try this one. The order depends upon the position of the dot on the sloping line.

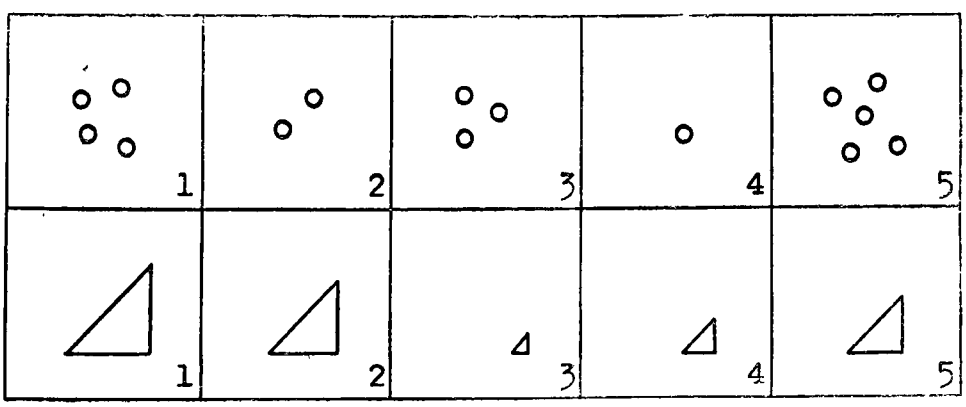
Write your answer in the box for Sample 4 on the answer sheet.



Sample 4

Now try these two. You must find out for yourself how they are to be arranged in order.

Write your answers in the boxes for Samples 5 and 6 on the answer sheet.



Sample 5

Sample 6

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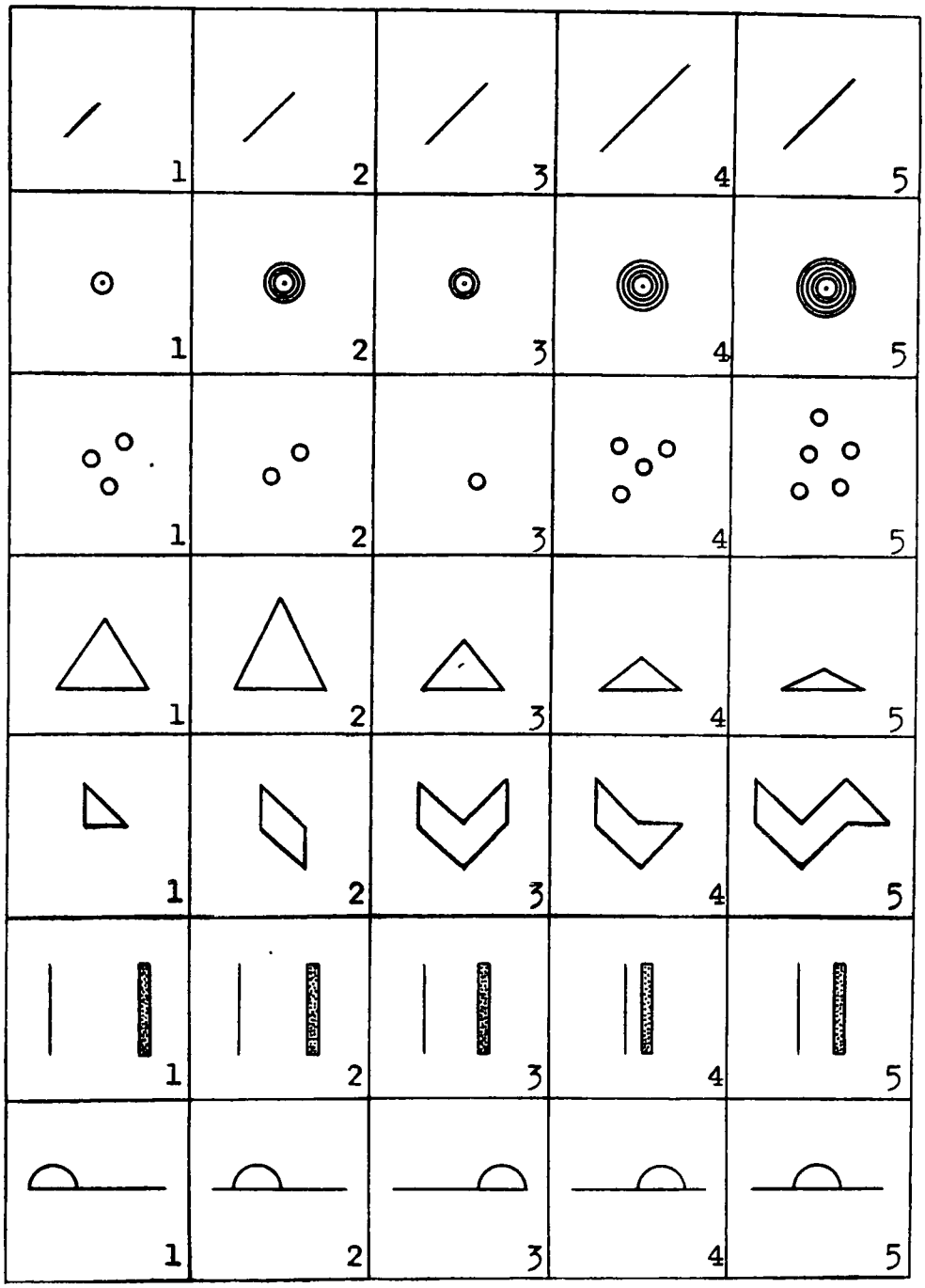
TEST 2

Which two should change place in each row, to arrange the shapes in their right order? Write their numbers on the answer sheet in the spaces marked with the same letter as appears at the right of each row.



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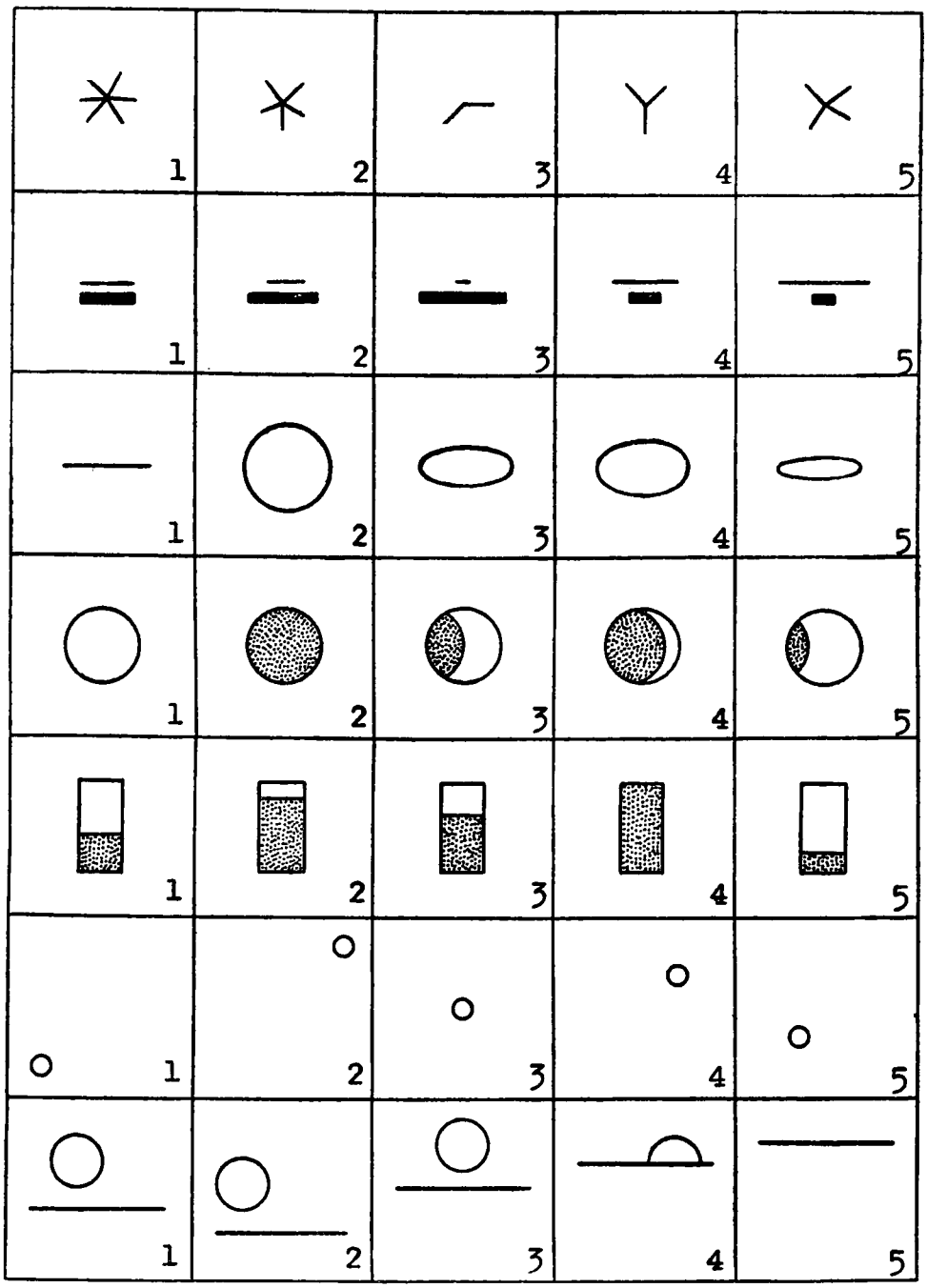
TEST 2



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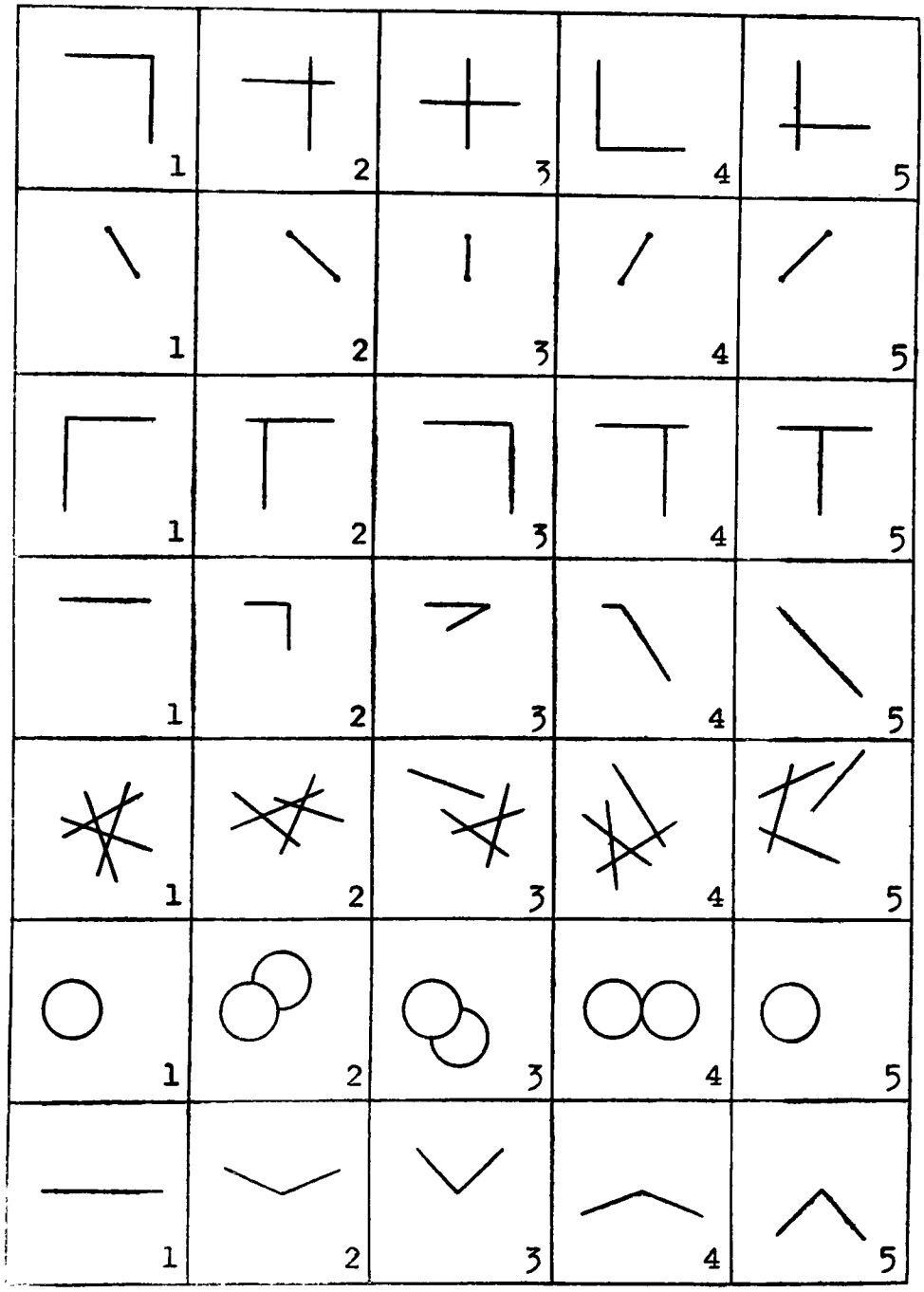
TEST 2



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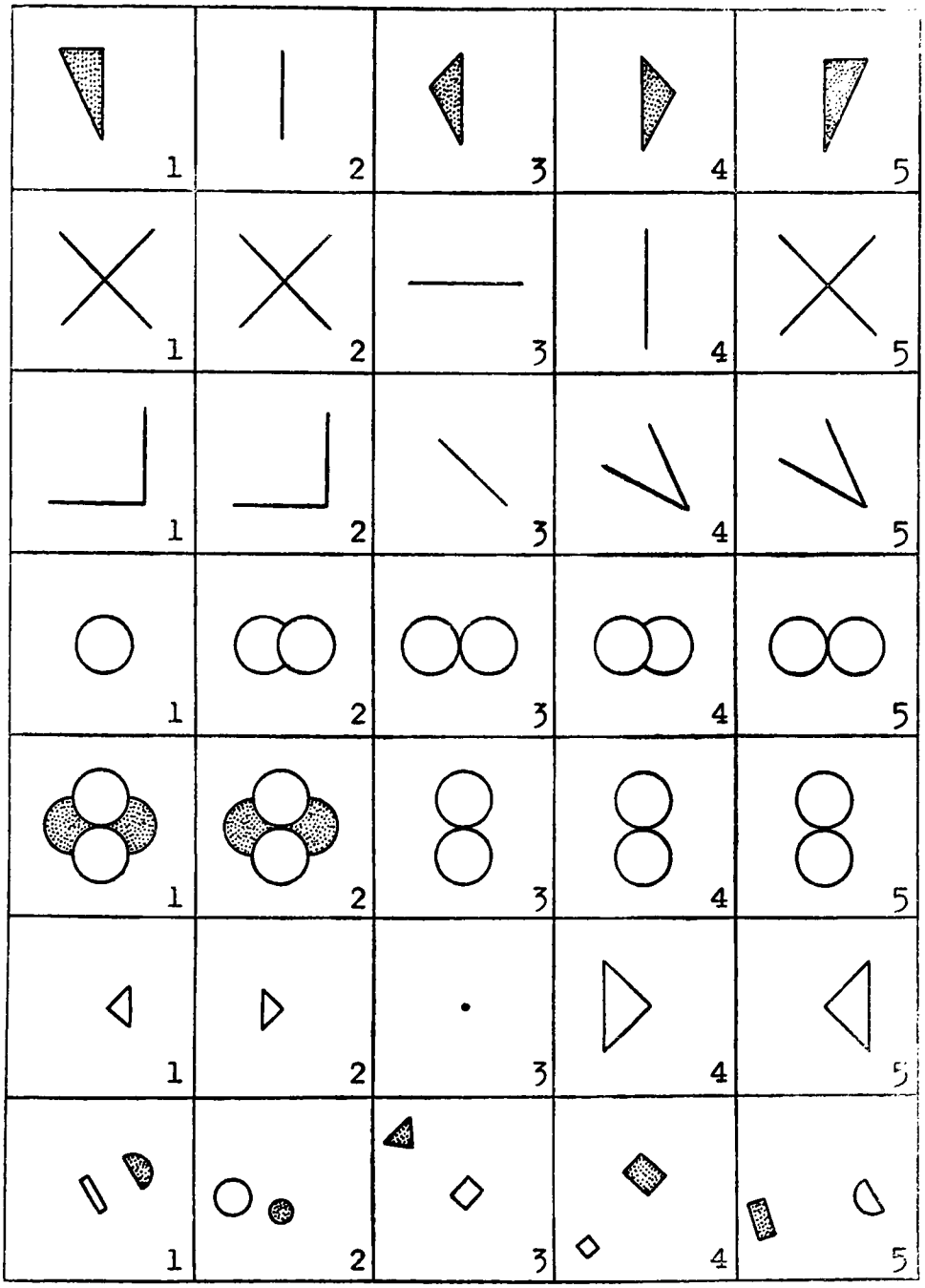
TEST 2



2M v.8.47

National Institute of Industrial Psychology.

Group Test 33.

GENERAL INSTRUCTIONS.

FOR EXAMINER'S USE ONLY	
TEST	SCORE
I	
II	
III	
IV	
V	
TOTAL	

DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD.

Fill in the following at once:—

Surname..... .....First Names.....

Age in Years.....and Months.....Today's Date.....

School.....Form.....

1. **Read this page carefully. Do not look at any other page until you are told.**

2. The question paper contains five tests, each consisting of a number of short problems. The time allowed for each test (either 8 or 10 minutes) is shown at the head of the test.

3. When the examiner says "Turn over; first test: Opposites," turn over immediately to the following page, and work Test I., according to the directions which you will find at the top. When three minutes are over, a similar signal will be given; you must then turn over to Test II. And so for the remaining tests.

4. The examiner will call out the name of each test as you are to begin it; see that you are doing the right test. But do not begin the next test until the examiner tells you to.

5. Notice that some tests occupy two or three pages. Do not wait to be told to begin the second or third page with these.

6. In answering the questions there will be **nothing to write.** You will have to pick out the correct answer and **underline** it only. Use pencils only. No ruler or india-rubber is allowed.

7. **You are unlikely to be able to finish the whole of any test.** Work as fast as you can. Do not lose time by spending too long over any one problem.

TEST I. OPPOSITES.

(Time allowed, 8 minutes.)

Where the two words mean the same or nearly the same, draw a line under SAME.
Where they mean the opposite or nearly the opposite, draw a line under OPPOSITE.
Where you do not know which they are, draw a line under UNKNOWN.

EXAMPLES :—

Rich ... Poor ... SAME ... OPPOSITE ... UNKNOWN.
Big ... Large ... SAME ... OPPOSITE ... UNKNOWN.

1.	Dry	Wet	SAME ... OPPOSITE ... UNKNOWN		1
2.	Hot	Cold	SAME ... OPPOSITE ... UNKNOWN		2
3.	Sick	Ill	SAME ... OPPOSITE ... UNKNOWN		3
4.	Lost	Found	SAME ... OPPOSITE ... UNKNOWN		4
5.	Kind	Cruel	SAME ... OPPOSITE ... UNKNOWN		5
6.	Dirty	Unclean	SAME ... OPPOSITE ... UNKNOWN		6
7.	Asleep	Awake	SAME ... OPPOSITE ... UNKNOWN		7
8.	Pull	Push	SAME ... OPPOSITE ... UNKNOWN		8
9.	Scarce	Rare	SAME ... OPPOSITE ... UNKNOWN		9
10.	Tender	Tough	SAME ... OPPOSITE ... UNKNOWN		10
11.	Preserve	Destroy	SAME ... OPPOSITE ... UNKNOWN		11
12.	Blunder	Mistake	SAME ... OPPOSITE ... UNKNOWN		12
13.	Belief	Doubt	SAME ... OPPOSITE ... UNKNOWN		13
14.	Haughty	Arrogant	SAME ... OPPOSITE ... UNKNOWN		14
15.	Adversity	Prosperity	SAME ... OPPOSITE ... UNKNOWN		15
16	Droll	Odd	SAME ... OPPOSITE ... UNKNOWN		16
17.	Abandon	Discard	SAME ... OPPOSITE ... UNKNOWN		17
18.	Cultivated	Wild	SAME ... OPPOSITE ... UNKNOWN		18
19.	Permissible	Prohibited	SAME ... OPPOSITE ... UNKNOWN		19
20.	Backwards	Reversed	SAME ... OPPOSITE ... UNKNOWN		20
21.	Slow	Tardy	SAME ... OPPOSITE ... UNKNOWN		21
22.	Cancel	Annul	SAME ... OPPOSITE ... UNKNOWN		22
23.	Frank	Candid	SAME ... OPPOSITE ... UNKNOWN		23
24.	Culpable	Innocent	SAME ... OPPOSITE ... UNKNOWN		24
25.	Feasible	Practicable	SAME ... OPPOSITE ... UNKNOWN		25

26	Creditable	...	Disreputable	...	SAME	...	OPPOSITE	...	UNKNOWN	26
27.	Slanting ...	...	Oblique ...	...	SAME	...	OPPOSITE	...	UNKNOWN	27
28.	Inanimate...	...	Dead ...	...	SAME	...	OPPOSITE	...	UNKNOWN	28
29.	Indefinite...	...	Vague ...	...	SAME	...	OPPOSITE	...	UNKNOWN	29
30.	Deprive ...	...	Restore ...	...	SAME	...	OPPOSITE	...	UNKNOWN	30
31.	Ratify ...	...	Confirm ...	...	SAME	...	OPPOSITE	...	UNKNOWN	31
32.	Inevitable...	...	Avoidable ...	...	SAME	...	OPPOSITE	...	UNKNOWN	32
33.	Infamous ...	...	Notorious ...	...	SAME	...	OPPOSITE	...	UNKNOWN	33
34.	Precise ...	...	Erroneous ...	...	SAME	...	OPPOSITE	...	UNKNOWN	34
35.	Lasting ...	...	Transitory ...	...	SAME	...	OPPOSITE	...	UNKNOWN	35
36.	Sagacity ...	...	Imbecility ...	...	SAME	...	OPPOSITE	...	UNKNOWN	36
37.	Docile ...	...	Recalcitrant	...	SAME	...	OPPOSITE	...	UNKNOWN	37
38.	Malevolent	...	Propitious ...	...	SAME	...	OPPOSITE	...	UNKNOWN	38
39.	Enmity ...	...	Animosity ...	...	SAME	...	OPPOSITE	...	UNKNOWN	39
40.	Conclusive	...	Irrefutable ...	...	SAME	...	OPPOSITE	...	UNKNOWN	40
41.	Naive ...	...	Disingenuous	...	SAME	...	OPPOSITE	...	UNKNOWN	41
42.	Methodical	...	Capricious ...	...	SAME	...	OPPOSITE	...	UNKNOWN	42
43.	Relinquish	...	Cede	...	SAME	...	OPPOSITE	...	UNKNOWN	43
44.	Munificent	...	Parsimonious	...	SAME	...	OPPOSITE	...	UNKNOWN	44
45.	Inimitable	...	Unique ...	...	SAME	...	OPPOSITE	...	UNKNOWN	45
46.	Ambiguous	...	Equivocal ...	...	SAME	...	OPPOSITE	...	UNKNOWN	46
47.	Lugubrious	...	Hilarious ...	...	SAME	...	OPPOSITE	...	UNKNOWN	47
48.	Disparaging	...	Derogatory	...	SAME	...	OPPOSITE	...	UNKNOWN	48
49.	Miscellaneous	...	Heterogeneous	...	SAME	...	OPPOSITE	...	UNKNOWN	49
50.	Satiety ...	...	Repletion ...	...	SAME	...	OPPOSITE	...	UNKNOWN	50

TEST II. ANALOGIES.

(*Time allowed*, 8 *minutes*.)

In each question a fourth word is wanted which goes with the third word (in capitals) in the same way as the second word (in capitals) goes with the first. Look in the second line of each question for the word that is wanted ; and draw a line under it. **Do not write anything.**

EXAMPLES :—

GOOD is to BAD as WHITE is to
CLEAN, BLACK, WICKED, RED.

BAKER is to BREAD as TAILOR is to
TAILORESS, CAKE, MAN, CLOTHES

1. FATHER is to MOTHER as HUSBAND is to
RED, WIFE, GREEN, BUSINESS.

2 UP is to DOWN as HIGH is to
LOW, BOOK, COAL, DIFFICULTY.

3. PRINCE is to PRINCESS as KING is to
DUCHESS, CROWN, QUEEN, ROYAL

4. PARENT is to CHILD as MOTHER is to
WIFE, MAID, DAUGHTER, SERVANT.

5. FIRE is to HOT as ICE is to
CREAM, WATER, SOLID, COLD.

6. EAT is to BREAD as DRINK is to
DRUNKARD, THROAT, CUP, WATER.

7. SITTING is to CHAIR as SLEEPING is to
WALKING, TIRED, BED, DREAM.

8. JANUARY is to DECEMBER as SUNDAY is to
TUESDAY, MONDAY, SATURDAY, WINTER.

9. FLYING is to BIRD as CREEPING is to
AEROPLANE, SNAIL, GROUND, FLOWER.

10. TEARS are to SORROW as LAUGHTER is to
JOY, SMILING, CRYING, MISERY.

11. SIGHT is to PICTURE as HEARING is to
SONG, COLOUR, EAR, SEEING.

12. EGG is to BIRD as SEED is to
PLOUGHMAN, FOWL, PLANT, WHEAT.

13. REMEMBER is to PAST as ANTICIPATE is to
FANCY, FUTURE, FORGET, PRESENT.

14. BEAR is to CUB as DOG is to
CAT, SPANIEL, PUPPY, KITTEN.

15. FACT is to FICTION as HISTORIAN is to
HISTORY, BOOK, NOVELIST, MATHEMATICIAN.

16. BEAUTY is to ART as TRUTH is to
SCIENCE, MUSIC, ARTIST, LIAR.

17. ASLEEP is to AWAKE as DEAD is to
HEAD, CORPSE, ALIVE, MORTALITY.

18. FOOD is to MAN as FUEL is to
WOMAN, STEAM, ENGINE, VAPOUR.

19. SKY is to GROUND as CEILING is to
GAS, WALL, FLOOR, CHANDELIER.

20. SWEET is to HONEY as SOUR is to
SUGAR, SALT, VINEGAR, PEPPER.

21. HORSE is to MULE as DOCILE is to
RIDER, STUBBORN, DONKEY, MAN.

22. WHEN is to WHERE as TIME is to
HOW, WHY, SPACE, LENGTH

23. MOTIVE is to METHOD as WHY is to
WHERE, MANNER, REASON, HOW.

24. CAUSE is to EFFECT as DISEASE is to
REASON, CONSEQUENCE, DEATH, LIFE.

25. THE DAY BEFORE YESTERDAY is to THE DAY AFTER TO-MORROW as SATURDAY is to
SUNDAY MONDAY. WEDNESDAY, FRIDAY

TEST III. MIXED SENTENCES.

(Time allowed, 3 minutes.)

The words in each sentence below are mixed up. Think how the sentence would read if the words were arranged in the proper order. Then, if what the sentence means is TRUE, draw a line under "TRUE"; if what it means is NOT TRUE, draw a line under "FALSE"; otherwise, draw a line under "UNKNOWN."

EXAMPLES.—

a roses odour pleasant have... ... TRUE ... FALSE ... UNKNOWN

freezes water hot when ... ... TRUE ... FALSE ... UNKNOWN

1. paper burn will ... ... TRUE ... FALSE ... UNKNOWN 1
2. land sail dry ships on ... ... TRUE ... FALSE ... UNKNOWN 2
3. read meant to be are books... ... ... TRUE ... FALSE ... UNKNOWN 3
4. night sleep time is the at to best ... ... TRUE ... FALSE ... UNKNOWN 4
5. girls up men grow when become they ... ... TRUE ... FALSE ... UNKNOWN 5
6. year season winter the the is of coldest ... ... TRUE ... FALSE ... UNKNOWN 6
7. are there in three yard feet one ... ... TRUE ... FALSE ... UNKNOWN 7
8. parents disobey child a should always his... ... TRUE ... FALSE ... UNKNOWN 8
9. seven twenty-five five are times ... ... TRUE ... FALSE ... UNKNOWN 9
10. happiness invariably source crime of is a... ... TRUE ... FALSE ... UNKNOWN 10
11. caused by are disasters great sometimes accident TRUE ... FALSE ... UNKNOWN 11
12. out manufactured are glass chalk iron and of principally ... ... TRUE ... FALSE ... UNKNOWN 12
13. deceptive occasionally extremely are appearances TRUE ... FALSE ... UNKNOWN 13
14. pleasure innocence are and another with not one compatible ... ... TRUE ... FALSE ... UNKNOWN 14
15. annual week a once held celebration is an ... TRUE ... FALSE ... UNKNOWN 15

16. of the friendship a person unhappy us makes ... TRUE ... FALSE ... UNKNOWN 16

17. rabbits exceedingly mice are and bold both ... TRUE ... FALSE ... UNKNOWN 17

18. heat solids necessary is to certain melt ... ... TRUE ... FALSE ... UNKNOWN 18

19. best form the and policy dishonesty infidelity ... TRUE ... FALSE ... UNKNOWN 19

20. sun moon the the are and from feet six other only distant each ... ... TRUE ... FALSE ... UNKNOWN 20

21. light dark clearly requisite artificial see is the to in TRUE ... FALSE ... UNKNOWN 21

22. bombs explosive revolvers all swords are gun-powder and ... ... TRUE ... FALSE ... UNKNOWN 22

23. possible live nourishment taking years without is to it for... ... ... TRUE ... FALSE ... UNKNOWN 23

24. the the a of should weather yacht captain sailing always consider ... ... TRUE ... FALSE ... UNKNOWN 24

25. all all thieves murderers women men are are and TRUE ... FALSE ... UNKNOWN 25

26. assistance great attention close mistakes number decreasing of of the may in be ... ... TRUE ... FALSE ... UNKNOWN 26

27. some some some some all at nothing people pipes cigars cigarettes smoke ... ... TRUE ... FALSE ... UNKNOWN 27

28. there if doctors hospitals no or were die would more far people young ... ... TRUE ... FALSE ... UNKNOWN 28

29. infant youth man the are in of increasing order foregoing printed age correctly... ... ... TRUE ... FALSE ... UNKNOWN 29

30. a inquest coroner's at held is as such an inquiry demand to law by supposed deaths are sudden TRUE ... FALSE ... UNKNOWN 30

TEST IV. COMPLETING SENTENCES.

(*Time allowed*, 10 *minutes*.)

Underline the word, phrase, or number, that makes the best sense, wherever there are three printed one above the other.

EXAMPLES :—

Monday and January / Tuesday / Autumn are months / years / days of the week.

The man fell / rode / climbed off his bicycle and cured / broke / changed his arm

1. Grass is green / wet / blue but the sky is green / wet / blue.
2. A kind / healthy / cruel child is always / often / seldom ill.
3. A young / middle-aged / good artist paints well / badly / sign-boards
4. Orange, potato and raspberry are all names of yellow / lemon / colours / vegetables / fruit.
5. It is dark / light / fine in the day-time, but it is dark / light / fine at the equator / noon / night.
6. I saw a beggar in the street / hotel / parlour and owed / showed / gave him sixpence to steal / sell / buy some food.
7. How often do people praise / condemn / profit in others the very virtues / faults / serious they are guilty of themselves / perceiving / pardoning.
8. The poor man in his rich / mansion / cottage is often far less happy / home / than and the poor like / woman / man in his hut.
9. If Robinson runs faster than Jones, and Jones runs faster than Brown, then Smith runs slowest / fastest / backwards of the three.

seven words 1234567 6905678

10. The preceding groups of letters are identical ; 1234321 and 7543218
following figures 8224338 1234321

hear station helpful telescope

11. In order to see clearly at a telephone it is unnecessary to use a telegraph.
speak distance rare microscope

Two

12. Three boys are standing in a line ; John is to the left of Henry ; William is to the left of John.
Four

John

Hence, Henry is in the middle.

William

a million four hands upon

18. Almost every man is born with long arms and two legs attached to his body, and a
every other two ears beneath

hands

pair of eyes to hear with.

ears

crooked

14. Three towns lie in a straight line. Norton is East of Melton ; Wilton is East of Norton.
curved

North

Hence, Melton is East of Wilton.

West

Friday before Thursday

15. If to-day were Saturday, then the day after to-morrow would be Tuesday.
Sunday preceding Wednesday

is a more beautiful metal

16. (*a*) Gold is more suitable for the coinage than iron because it is scarcer and so more valuable.
does not rust so quickly

mountain-tops the sun seldom shines on them

(*b*) High valleys are covered with perpetual snow, because they are so near the clouds.
buildings the atmosphere is so cold

there wishes seeing officer

17. Such as the officer is such will be his enemies, and hoping that in this instance the man was
they men wishing enemy

not brave

a coward, we are very surprised to find the men were cowards likewise.
always enemies

[Turn over now.

18. A man writing on January 1st, 1922, said : My sister, who was born / died / was married on November 13th, 1858. / 1898 / 1900

will be twenty-five / thirty-three / thirty-four years old next year / November. / month

19. It has been argued that Mohammed was both / either an enthusiast / ignoramus / evangelist or an impostor; and, were this

true, those who / may / will deny that Mohammedanism / Christianity / he was an infidel / insincerity would be forced to conclude that he / was an enthusiast

must / should / could not have been an impostor.

20. Nancy is the oldest / baby sister; when Jane tells Winnie to look after Nancy, / Winnie Jane generally refuses if

Grace or Mary is in the house, because Winnie is Grace's pet sister / Mary / Grace and can also order Mary

about just as Grace orders Jane about. Therefore, of the five sisters Nancy / Jane / Grace / Mary Winnie is probably the

oldest; Nancy / Jane / Grace / Mary Winnie is probably the next; Nancy / Jane / Grace / Mary Winnie is probably the third; Nancy / Jane / Grace / Mary Winnie the fourth, and

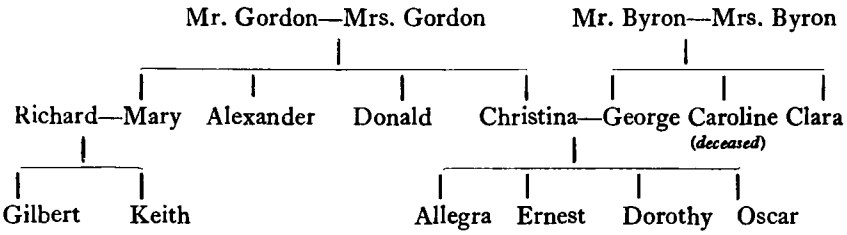
Nancy / Jane / Winnie the youngest / Grace / Mary

TEST V. REASONING.

(Time allowed, 10 minutes.)

In each of the following problems, underline the word or words indicating the correct answers. Nothing is to be written.

(1—3) The following chart gives the complete pedigree of the families concerned :—



1. What relation is Richard to Christina ? Son, Cousin, Stepsister, Stepbrother, Brother-in-law ?
2. What relation is Oscar to Mr. Gordon ? Son, Grandson, Greatgrandson, Nephew ?
3. How many aunts living has Oscar ? One, Two, Three, Four ?

(4—6) Find, in each set of five given on the right, two letters or numbers that suitably continue the series indicated on the left.

4. 30, 50, 70, 90. 100, 120, 130, 140, 110.
5. Z, A, Y, B. Z, Y, X, C, D.
6. $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1. 2, 3, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{4}$.

(7—9) Underline in each row two words that do not belong to the same class or category as the rest :—

7. Hat, Head, Boot, Shoe, Stocking, Hand, Glove.
8. Oil, Quicksilver, Bladder, Lead, Boat, Cream, Cork.
9. Franc, Shilling, Rupee, Pound Sterling, Sovereign, Farthing, Penny.
10. Caloot is 50 miles due west of Balassa ; Balassa is 50 miles due north of Agra :—

    Is Agra (i) North-East, (ii) North-West, (iii) South-West, (iv) South-East, of Caloot ?

    (v) Or is it impossible to say without further information ?

(11—13) In each line below, imagine the words arranged in order of size or importance without re-writing or numbering them) ; and then underline the middle word of the series as thus re-arranged :—

11. Twenty-two, fourteen, twenty, sixteen, eighteen.
12. Foot, inch, furlong, mile, yard.
13. Volume, letter, chapter, sentence, paragraph.

Turn over now.

(14—15) In a certain territory 80 per cent. of the inhabitants were against German rule, and 60 per cent. were against French rule :—

14. Were there any against both French rule and German ?

ANSWER. (i) Yes ; (ii) No ; (iii) One cannot say without further details.

15. Were there any who were not against either ?

ANSWER. (i) Yes ; (ii) No ; (iii) One cannot say without further details.

16. Kenneth Digby was five days younger than Sir Thomas Browne ; and Digby was born on December 28th, 1605. In the year 1630 Christmas was on a Friday.
On what day of the week did Browne's birthday fall in that year ?

ANSWER. (i) Monday ; (ii) Tuesday ; (iii) Wednesday ; (iv) Thursday ; (v) Friday ; (vi) Saturday ; (vii) Sunday.

17. All the trains from this platform stop first at Ayton ; but after that some go to Beaton and Seaton ; and others branch off to Deeton and Eaton. There are no other stations. The fare to Eaton or Seaton is one shilling ; elsewhere sixpence.

Brown had a sixpenny ticket, and, although in a hurry, did not get in the first train which was going towards Eaton.

Where do you think he was travelling to ?

ANSWER. (i) Ayton ; (ii) Beaton ; (iii) Seaton ; (iv) Deeton ; (v) Eaton ; (vi) Either Ayton or Beaton ; (vii) Either Beaton or Deeton ; (viii) It is impossible to say without further details.

18. The murdered man made the following statement just before his death :—
" I heard the clock strike yesterday, a quarter of an hour before the first shot was fired. I was too occupied to count the strokes of the clock-bell, but from the rhythm I am sure it must have been an even number. I had been out of doors for fifteen hours continuously since the preceding midnight, and had not long returned."

The man's clock had stopped at 5 to 6 that same evening.

When do you think the first shot was fired ?

ANSWER. (i) About 4 o'clock ; (ii) $\frac{1}{4}$ to 4 ; (iii) 4.15 p.m. ; (iv) 5.15 p.m. ; (v) 6.15 p.m. (vi) $\frac{1}{4}$ past 4 in the morning ; (vii) Impossible to say without further details

Published by the National Institute of Industrial Psychology, Aldwych House, W.C.2. 20M.6 48.Gr.

PRINTED IN GREAT BRITAIN